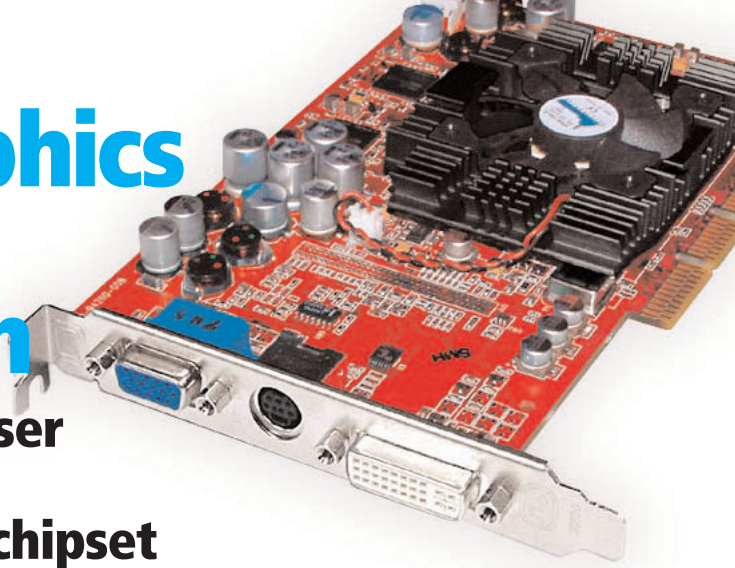


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We take a closer
look at ATI's
Radeon 9700 chipset



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Audio restoration

We show you
how to get
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FROM THE FRONT



Normal service

Many of you devoted, hardcore *PC Magazine* fans will still be mourning the loss of the print title. But never fear—our *PC Magazine* e-book is still flying the flag

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Welcome to the second trial issue of the *PC Magazine* e-book. It's designed to be complementary to our print sister publication *Personal Computer World (PCW)*, which has taken on some of *PC Magazine's* old print role. We're hoping to add to this for the benefit of the hard core *PC Magazine* enthusiast. To do this we need your help, so please let us know what you'd like to see in this complementary e-book.

You'll see that *PCW* has already implemented some changes to address your information needs and that Alan Stevens' Network section is now part of the new improved *PCW*. And there is a lot more to come, specifically to incorporate the breadth of products and coverage that the *PC Magazine* audience value.

But we want to offer something that will retain the spirit of *PC Magazine* and its very labs-focused view of the world for its core audience. And that's where the e-book comes in.

Take this month for example. With Christmas upon us it might be time to sort out a few things at home. If, for example, you have a stack of old LPs you'd like to bring in to the digital age, perhaps you should look at our audio restoration feature. If you get on with it quickly enough you might even have some of your favourite tunes on CD for the New Year party celebrations...

We also take a look at a couple of interesting products to pass across the desks of our VNU Labs staff over the last few weeks. First of these is D-Link's 802.11b enhanced wireless LAN system, which can double the speed of a normal 802.11b wireless link. But is it worth it with backwards compatible (and faster) 802.11g already in the wings and about to be released in the UK? You can find out by reading the review on page 10.

And then there's the Netbox Cubit. Okay, it's not big and, with an 800MHz VIA processor, it's not especially clever. But it's built in Britain, looks great and is quiet enough to sit by your TV—so could form the heart of a home entertainment set-up (see page 11).

If you want something that will help make those Christmas PC games a bit more fun, then what could be better than a state-of-the-art graphics card? Barely a month passes without another step forward in graphics technology. This time it's ATI and its Radeon 9700 chipset that looks set to boost your frame rates and enhance your gaming pleasure. More on the new technology on page 22.

Finally we're back with our regular Solutions pages at the back of the issue. Turn to page 32 to follow the next instalment of our content management system development, improve your Excel data handling and find out what the alternatives to Perl are.

I hope you like what you see in these early electronic issues of *PC Magazine*. Please let me know by dropping me an email today. ■

We want to offer something that will retain the spirit of *PC Magazine* and its very labs-focused view of the world



TECH TALES

High fidelity

DVD-Audio is the most advanced audio recording technology around, so why aren't more people using it? If a DVD-Audio player cost less than £90, would you be more tempted?

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If you're a music lover and frequent high street music shops, you may have noticed over the past few months that a new and rather puzzling section has appeared. Usually sitting somewhere between the CD racks and DVD-Video titles, there will be a small selection of titles housed in what, at first glance, look like over-sized audio CD jewel cases. In the local outlet of a large audio-visual superstore, it's a rather forlorn sight, with three shelves and a couple of dull tattered cardboard logos with very little explanation as to what it's all about. You could be forgiven for not realising that this section represents some of the most advanced audio recording technology available—DVD-Audio.

DVD-Audio isn't new—the final specification was released in March 1999. At present, the cheapest DVD-Audio standalone player retails for around £300 (inc. VAT) and an entry-level system (such as the Panasonic SC-DT300) including player, amplifier and a 5.1 speaker system costs just under £500 (inc. VAT).

But why am I wandering into home entertainment or even audiophile territory? Isn't this *PC Magazine*? Of course it is, but that brings me to the point of this month's musings. If I told you that you could convert your PC into a DVD-Audio player for less than £90, would you be interested?

But, in the spirit of a good yarn down the pub, I'm not going to spoil a good story in the first couple of paragraphs. First of all, let's delve a little into the background and technicalities of DVD-Audio.

To put things in perspective, consider a standard audio CD. The analogue source signal is digitised using 16-bit data words with a sampling frequency of 44.1KHz. The audio frequency range is specified as 20 to 20,000Hz, which corresponds roughly to the range of human hearing. The dynamic range of the signals that can be represented is greater than 90dB.

With DVD-Audio, the higher data transfer rate possible with a DVD disc (about 10Mbit/s maximum) allows for much higher sampling rates and multi-channel sound. The DVD-Audio standard specifies 24-bit recording at up to 192KHz sample rate for stereo channels, or 96KHz for up to six channels. This gives a maximum frequency response (for 192KHz sampling) of up to 96KHz and a dynamic range of 144dB. When you consider that the noise level of a jet engine on full power generates about 130dB, you can see that this is quite adequate for most sane purposes unless you have some very impressive playback equipment and ears to match.

Although these numbers might impress some audiophiles (even if there's no domestic audio equipment around that can hope to play the full frequency range), a vital difference between DVD-Audio and Dolby Digital 5.1 audio, which we're used to hearing in DVD-Video titles, is that DVD-Audio is encoded using Meridian Lossless Packing (MLP). This lossless compression scheme increases the amount of content you can squeeze onto a disc. To decode the MLP data you need a decoder—which is the only major difference between a DVD-Video player and a DVD-Audio player. An optional Dolby Digital 5.1 surround-sound mix of the DVD-Audio content is provided for in the standard. This allows multi-channel playback on almost any domestic DVD player or DVD-ROM drive.

DVD-Audio also features multimedia capabilities similar to those of DVD-Video. Producers can add in navigation menus, still pictures or video clips. For the Dolby Digital mixes, it's more limited—you'll only find perhaps a playlist menu and a few still pictures or lyric sheets. The other thing that DVD-Audio offers is a very comprehensive set of copy-protection measures, including encryption and audio watermarking, but I'm sure you'd already guessed that. It doesn't, however, use region coding.

This is all well and good, but how does this relate to my PC? MLP decoders for the PC aren't currently available to the general public—unless you buy Creative Labs' latest sound card, the Audigy 2. This is a 24-bit, 192KHz card that's the first to carry the DVD-Audio logo. The MLP decoding is done in the DSP chip and the driver, and there's a software DVD-Audio player bundled with it. You can pick up the base version of the card for around £75 (ex. VAT), so if you already have a 5.1 speaker setup on your PC, you could save yourself a tidy sum of money if DVD-Audio is something that interests you. Warner International recently re-issued about 60 'classic' albums in DVD-Audio format—I've listened to a couple and it's an interesting experience. The original tracks have been totally remastered before creating the multi-channel mixes, making some tracks almost unrecognisable. Sometimes this works well, adding ambience and clarity, but at other times it's obvious that the engineers have been having a laugh. I'm not an audiophile, but I can notice differences between the Dolby Digital mix and the 96KHz 5.1 audio.

Whether the format will take off is debatable—the industry obviously hopes so. Whatever the case, I know what I want Santa to put in my stocking. ■

There will be a small selection of titles housed in what, at first glance, look like over-sized audio CD jewel cases

TRENDS

ANALYSIS | PREVIEWS | TECHNOLOGY | OPINION

Low-cost PDAs develop

Dell launches its Axim X5 Pocket PC, costing just \$199 but only available in the US

PC maker Dell has introduced its low-cost X5 PDA based on Microsoft's Pocket PC platform in the US, while Microsoft has said that it's collaborating with Samsung on a concept design to help vendors bring low-cost PDAs to market more quickly.

UK firms will have to wait until next February for the XS. The device comes in two versions—one with a 400MHz Intel XScale chip and 64MB memory at \$299, and a 300MHz model with 32MB memory at \$199. Both are based on Pocket PC 2002 and feature colour displays, with CompactFlash and Secure Digital card slots.

Dell will also offer customer-friendly features, such as a removeable battery pack, an optional second battery that will last up to 25 hours and a desktop cradle, which is able to charge both a



▲ Dell enters handheld PC market

spare battery and the Axim at the same time.

More low-cost handhelds may soon become available through a new concept design from Samsung. Working with Microsoft, Samsung said that it has dramatically reduced the complexity and cost of its product to help manufacturers build PDAs for the value sector of the market. Palm currently dominates the market for handhelds costing less than £200.

Samsung's design uses its own ARM-based S3C2410 chip and includes support for Secure Digital storage and expansion cards. Samsung said the design

sets a new standard for small dimensions, with devices measuring 10 by 7cm and, at 90g, weighing about half as much as other PDAs. Products based on the design could be shipping within six months, according to Microsoft. **JO TICEHURST**

Intel processors up workstation power

New Xeons introduce a 533MHz system bus to boost workstation performance

Intel has introduced four new Xeon processors aimed at PC workstations and servers, along with motherboard chipsets to support their new capabilities. As well as increased clock speeds, the new products introduce several performance-enhancing features, including a faster system bus and dual memory channels using Double Data Rate (DDR) memory.

The new Xeon processors are available now at clock speeds of 2.8GHz, 2.6GHz, 2.4GHz and 2GHz, and are aimed at dual-processor workstations and servers. The major new feature of the chips is a faster system bus running at 533MHz that allows faster transfer of data between the processor and memory.

Intel also introduced three new chipsets to support its newest processors. The E7501 chipset is aimed at dual-processor Xeon servers for Web caching and the telecoms market, Intel said. For workstations, the E7505 chipset supports dual-processor Xeon designs, while the 7205 is aimed at single-processor designs using Pentium 4s.

Also featured for the first time in the two workstation chipsets is the next version of the Accelerated Graphics Port (AGP) interface for high performance graphics subsystems. AGP 8X doubles the throughput of data to the graphics adapter to 2.1GB/s compared with the current AGP 4X standard, while retaining backward compatibility with the earlier version. **DANIEL ROBINSON, IT WEEK**

VERY MERRY CHRISTMAS FOR UK PC SALES

UK to enjoy sales surge—but US will miss out

It will be a gloomy Christmas for PC vendors in the US, but Europe will fare slightly better, according to figures from analyst Gartner.

The organisation said that vendors usually see a rise in sales during the fourth quarter as consumers buy new PCs for Christmas. But Gartner warned that a big boost wasn't expected in US sales this year.

'Given that home PC penetration is relatively high in the world's developed economies, limited funds may induce users to extend the life of their PCs,' said Gartner analyst George Shiffler.

'Many families may also choose other devices, such as game consoles, DVD players and digital cameras instead of upgrading their old PCs,' Shiffler commented.

'Economic uncertainty and its effects on business and consumer confidence will continue to impact PC sales in 2002 and 2003,' Shiffler added. 'On a regional basis, the US economy has clearly bottomed out and it remains weak and hesitant.'

However, in Europe, PC makers will still see an increase in sales, said Gartner.

'The UK is looking at growth in the home market for the fourth quarter, particularly on the mobile PC side. We predict mid-single digit growth in this market in the fourth quarter of the year—last year growth was flat,' Gartner analyst Ranjit Atwal told vnunet.com. **JO TICEHURST**

Plan carefully for 3GHz Pentium 4

Hyper-Threading features in Intel's latest desktop chips could lead to confusion

Lack of software optimised for the much-vaunted Hyper-Threading feature in Intel's new 3GHz Pentium 4 processor means most firms can't yet justify the management overhead of deploying the technology, according to recent *IT Week* tests.

Apart from exceptional cases, IT buyers should wait for software that can take advantage of the powerful new systems.

Hyper-Threading technology makes one processor appear as two to the software, but tests show it's difficult to predict whether software will speed up or slow down when the feature is enabled. Hyper-Threading was first used in Intel's Xeon high-end processors.

Intel launched the 3.06GHz version of its flagship Pentium 4 chip recently—the first with Hyper-Threading. The Pentium 4 is intended to replace the Pentium III family as Intel's high-volume processor for mainstream users.



▲ Lack of optimised software could be a problem

IT Week Labs found that Hyper-Threading caused a 25 per cent performance drop for Fluent's high-end fluid-flow simulation software. Test results published today for the new 3GHz desktop chip show that some common business software speeds up by about 15 per cent when the feature is enabled. But results for other applications range from an 88 per cent gain to a 25 per cent drop.

Intel recommends that Hyper-Threading should be activated only on systems that use

Windows XP or Linux, both of which support the feature. As most firms use neither on the desktop, our advice is broadly in tune with Intel's guidance.

Even Intel itself doesn't adopt the newest of its own processors. Intel chief information officer Doug Busch last week revealed that the chip giant's internal policy for upgrading desktops is to use one or two steps down from the fastest available processors. **ROGER HOWORTH & DAVE BAILEY**

Security warnings hit user confidence

High number of flaws caused by widespread use, says analyst

Frequent security flaws in software vendor's products are harming confidence and levels of trust among potential e-commerce users, say experts.

'This is something that has got to be acknowledged as an issue,' said Beatrice Rogers, e-business programme manager at industry body Intellect. Rogers says more emphasis should be placed on security

when software is being developed and it should also be extensively tested.

Phil Battison, European managing director at online payment service WorldPay says issuing security alerts makes unreasonable assumptions of users. 'There is a reliance on the individual to be savvy as to what's going on and to be pro-active,' he said.

Stuart Okin, Microsoft UK's chief security officer, says Windows' latest problems are 'critical' and he agrees that software flaws do nothing to promote confidence. 'This is why it's incumbent we get these changes to be automatic,' he said. 'The Internet was never built on secure protocols—it was never designed to be secure.' **EMMA NASH**

NEWS IN BRIEF

● **Volumes of spam have** rocketed over the last year, according to statistics issued by email security company MessageLabs. In January 2002 one in every 199 UK emails was spam. But by June this figure was one in 36 and in November it stands at one in eight. MessageLabs has so far intercepted 45 spam emails every minute in 2002.

● **AMD will launch the** delayed 64-bit Athlon chip, formerly known as 'Clawhammer', in the spring of next year. At Comdex in November this year, AMD president and chief executive Hector de Ruiz wheeled out former Guns 'n' Roses guitarist Slash. The audience was treated to a version of Bob Dylan's 'Knockin' on Heaven's Door', changed to 'Knocking on 64' to signal the title of AMD's 64-bit chip. The Athlon 64, which features support for legacy 32-bit applications as well as 64-bit computing, will be available in the first half of next year.

● **Microsoft has found a flaw** in some versions of Windows that could allow attackers to reformat your hard disk. In its 65th security bulletin issued this year, the company warned that two types of computers are at particular risk: those used for browsing the Web or reading email and those hosting Web sites using Microsoft Internet Information Services. This issue doesn't affect Windows XP, but anyone using Microsoft Windows 2000, Windows ME, Windows 98 SE, Windows 98 or Windows NT 4.0 needs to download a security patch.

TRENDS

ANALYSIS | PREVIEWS | TECHNOLOGY | OPINION

DOUBTS RAISED
OVER MICROSOFT
PATCHESFlaws found in computer
giant's security fixes

Security patches released by Microsoft last week may not completely protect users, according to a Danish security consultancy.

Microsoft security alert 65 and alert 66 deal with the Windows operating system and Internet Explorer, and are rated 'critical' and 'important' respectively. Alert 66, a bundled software patch for Internet Explorer 5 and 6, is aimed at fixing six specific faults in the browser.

Simon Conant, of Microsoft product support services, said: 'If users update with this patch they will be covered for all the currently known security flaws. They'll still need to use patch 65 as well as that's not a specific Internet Explorer patch, but can affect the software.' But Danish security company Secunia said it has identified flaws with both patches.

Microsoft has admitted patch 65 may not be fully effective in certain circumstances, but it has made no mention of problems with patch 66. Although patch 65 offers a broad solution, it is still vulnerable to malicious Web sites and HTML emails. If the browser automatically downloads ActiveX controls it might be possible to re-introduce malicious code.

The software giant has suggested that users remove its software from the Trusted Publisher list and check the software's origin before downloading.

Part of the flaw in patch 66 means it's still possible for a Web site to run an executable that is stored on a system. This could allow an outsider to view the contents of a previously identified file and view the clipboard.

Secunia spotted the flaws while installing and checking the patches. Thomas Kristensen, chief technical officer of Secunia, said: 'The only way around the problems is to manually install all digital certificates after checking their veracity and who wants to do that?' *IAIN THOMSON*

Transmeta targets Europe

Next-generation low-power CPU will find market when launched next year

Chip maker Transmeta says Europe is now ready for its low-power-consuming chips as it prepares to launch its latest processor, but analysts are less optimistic.

The US company claims its CPUs are lighter, smaller, generate less heat and use less battery power than similar ones from the big players—Intel and AMD. Transmeta has achieved a degree of success with its low-power chips in Japan, where a number of manufacturers have included them in their notebook PCs.

But despite a recent major boost from HP, which decided earlier this year to use the company's debut chip, Crusoe, to power its new Tablet PCs—Transmeta is yet to make any inroads into the European PC market.

This is about to change, the company claims, with the launch of its next chip, the Astro—or Transmeta 8000—due next year.

Chris Russell, European sales manager at Transmeta, told vnunet.com: 'Our first product was more successful in Japan, where people want smaller machines. Europe has traditionally been the leader in mobile phone adoption and that was

where the portability was required, but the market is changing in Europe now.'

Russell said the new chip would be aimed at the sub-notebook market, but that it could also be used in slightly larger machines. 'We also have an interest in the eco-notebook market, where people are looking for real low power and slim LCD displays,' he added.

Because the new chip will issue eight instructions per clock cycle instead of the four of the current chip, the processor will reduce power consumption and increase battery life.

Despite Transmeta's optimism, however, industry analysts are unconvinced. 'I wouldn't say this was a big announcement for Europe. For Transmeta to get market share and improve its position in the market, it needs design wins. They also need to ensure they don't have the delays they have had with previous products,' Annette Jump, analyst at Gartner, told vnunet.com. 'Despite the win with HP, we predict they will only have one per cent of the total notebook market next year. They need wins in the corporate market and they face difficult competition,' she added. *JO TICEHURST*

Microsoft rivals insist on stiff penalties

European Commission urged to take a tough line as anti-trust decision looms

Microsoft's rivals are again putting pressure on the European Commission to take a hard line as it nears a decision on its anti-trust case against the software giant.

The US-based Computer & Communications Industry Association (CCIA), a coalition of 30 technology companies, is calling for the Commission to force the break-up of Microsoft's Windows operating system.

In an article in the *Financial Times* Ed Black, chief executive of the CCIA, claimed that European anti-trust laws would be

undermined by a failure to take action against Microsoft. 'If [anti-trust law] is to really have a meaning for the IT industry then a meaningful decision in this case is essential,' he said.

CCIA members include some familiar Microsoft foes like Oracle, Sun Microsystems and AOL, as well as Nokia, Fujitsu, Yahoo, Nortel and Giga Information Group.

The Commission is believed to be close to reaching a decision following a four-year anti-trust inquiry into Microsoft. If

found guilty, the company could be forced to un-bundle some software from Windows and may face a fine of up to 10 per cent of its global revenues.

But Horacio Gutierrez, European lawyer for Microsoft, told the *Financial Times* that such a decision would severely harm the company's ability to operate and could be damaging to consumers.

'These competitors would not be satisfied with any remedy that stopped short of stopping Microsoft's ability to innovate,' he said. *ANDY MCCUE*

Wake up to the digital decade

Bill Gates promises 10 years of technological revolution

Microsoft chairman and chief software architect Bill Gates opened Comdex in Las Vegas last month by predicting 10 years of revolution in the way people and businesses interact, including smart alarm clocks that can tell you how late you'll be for work.

'During the course of the digital decade we'll think about personal computing in a different way,' he said. 'The magic of the chip and the magic of software are now spreading out to all different devices, and those devices are connecting up in very flexible ways.'

Widespread adoption of affordable wireless technology and the formation of an industry-wide Web services interoperability group, were major plusses in what has been a difficult 12 months, explained Gates.

'This past year had a lot of highs and a lot of lows,' he said. 'A tumultuous year, a tough year, a year to test the people with the long-term commitment. A year to test which innovations really meet the demands and requirements of customers in this kind of environment.'

Looking forward, Gates unveiled several new Microsoft products for the consumer and business markets, ranging from the next version of Office to a smart alarm clock.



▲ Would you buy a smart alarm clock from this man?

The next version of Office, due out next summer, will feature applications to improve knowledge management and collaboration, he said. Office users will be able to access XML information in back-end systems using XDocs.

Microsoft OneNote will allow users to organise meeting notes written in virtual ink or text, and manage audio files and HTML using a drag-and-drop interface that links with Outlook. It aims to eliminate people from the workflow.

A prototype Web service was also announced, which will be available in the US by the middle of next year.

Windows .Net Server 2003 release candidate 2 will be available in the next few weeks and the full release is scheduled for April 2003. The new version has an eight-node cluster, 64-way processor systems, support for 512GB memory and Hyper-Threading. A new version of the Visual Studio.Net development tools will also ship in April.

Gates also told the audience that Microsoft's Smart Personal Object Technology group has been looking at embedding intelligence into small, everyday devices. Gates showed off a range of clocks, fridge magnets, key chains and watches that are automatically updated with the time, current weather and the latest news. **ANDY MCCUE**

Flash memory prices set to rocket

Intel to push up prices by as much as 40 per cent

Intel has confirmed that it will increase the price of flash memory chips by as much as 40 per cent at the beginning of next year.

Flash memory is used to store information on devices like mobile phones and handheld computers. The chip maker told vnunet.com that the increase is a result of greater demand, particularly in the mobile phone market. An Intel spokesman said: 'It is true that we will be putting up the price of flash memory chips in all market segments by up to 40 per cent in January. There has been strong demand and growth in flash products, and analysts have predicted that 440 million mobile phones will have shipped to the channel this year.'

Gartner analyst Andrew Norwood confirmed that there has been an improvement in the flash market and warned that similar announcements

about price hikes should be expected in the near future from other manufacturers, such as AMD and Fujitsu Siemens. 'If Intel is able to raise prices then the others are able to do the same,' he said.

But the analyst suggested that the price increases could turn out to be much less than 40 per cent. 'Up to 40 per cent could mean as little as one per cent. When you want to raise prices you give a higher ballpark,' he explained. 'There is an underlying improvement in the flash market and this is good news for the semiconductor market. It is due in part to the mobile phone market. Last year's production of mobile phones was dire, but this year we have seen a rolling recovery. We are seeing more flash content and an increase in functionality means more and more flash memory in mobiles.' **JO TICEHURST**

NEWS IN BRIEF

● **Matthew Williamson**, a researcher at the Hewlett Packard laboratories in Bristol has found that imposing an email limit on PCs slowed down virus outbreaks long enough for technicians to eliminate them. According to the BBC programme *Go Digital*, instead of trying to discover a way to kill a virus, Dr Williamson looked at how to prevent it from infecting other computers and delay its spread. With a limit in place on the number of emails a PC can send, some viruses, which could be trying to send 100 or 200 infected messages, could be significantly slowed down, the programme reported.

● **UK domain registrar** Nominet has issued proceedings for an interim injunction for trademark infringement and passing-off against Domain Registrar Services (DRS), Scott Denny of DRS, and UK-names. If Nominet wins the case, it wants any items, products or materials regarding the trademark infringement to be delivered up or destroyed. It is also demanding the names and addresses of the companies to which DRS offered its services. Nominet also wants guarantees that will stop DRS, UK-names (which operates the uk-names.biz Web site and has no links to similarly named companies) and Scott Denny infringing its trademark and passing-off in the future.

● **Trend Micro has warned** that the 'Winevar' worm targets Windows' systems and has the potential to delete files. The worm propagates using its own Simple Mail Transfer Protocol engine and sends emails to addresses it gathers from infected systems. It uses a known exploit in Windows that automatically executes its attachment without a click on the part of the recipient and can also prevent anti-virus protection from working. The email arrives with 'N 4' in the subject line and comes with two attachments.

TRENDS

ANALYSIS | PREVIEWS | TECHNOLOGY | OPINION

NEWS IN BRIEF

● Analysts have warned that

Dell has chosen the wrong time to launch its long-awaited blade server. Dell first unveiled the new server back in April. Analysts expressed surprise that the product would not be shipping until much later, giving competitors a nine-month start on the market. But Steve Brazier, chief executive at analyst Canalis, was not surprised that Dell had taken so long to launch its product. He explained that there might not be many buyers at the moment. 'Blade servers suit Internet data centre applications, which have heavy usage,' he said.

● Disgraced telco WorldCom

has partially settled its \$9bn fraud case with US regulators after a federal judge approved a deal that will allow the company to emerge from bankruptcy. The partial settlement will see the continuation of a court-appointed monitor for the company to review its internal accounting. This role could be expanded to include mandatory accounting and ethics training for accounting staff for the next three years.

● Entertainment giants

queue up to sue Australia-based parent company of Kazaa, a popular online file-swapping service. US District Court Judge Stephen Wilson heard arguments on whether Sharman Networks, which is headquartered in Australia and incorporated in the Pacific island nation of Vanuatu, is subject to US copyright laws. 'It is a difficult question, but it has to be resolved,' said the judge.

● The UnitedLinux group has

released the first version of its standards-based Linux operating system for business users. UnitedLinux 1.0 will form the core of products to be sold by the group's members, which include SCO, SuSE, Turbolinux and Conectiva. It's the result of work by the members to streamline Linux development to create a standard distribution of the OS.

BT to test 'Midband' service

BT is planning to offer a new service to premises beyond the reach of true broadband

BT is expected to test a 128Kbit/s service called Midband next spring, aimed at people who can't access or afford broadband.

Speaking at the E-envoy summit in London last Tuesday, BT director Pierre Danon predicted that over 80 per cent of the country would be within reach of broadband within three years. But he admitted that technical limitations and high prices for options, such as satellite and wireless services, would still leave many people without broadband. 'There are technological limits to providing affordable broadband for all. So we are announcing Midband, an alternative high-speed access product,' he said.

BT's Midband offering will consist of two 64Kbit/s links bundled together to create a 128Kbit/s channel. It will presumably be based on BT's existing HomeHighway ISDN service, which offers identical bandwidths. The new service will not be completely always-on, but will provide always-on email, Danon said.



Trials of Midband are expected to begin in March or April and the service is expected to cost between £20 and £25 per month. Meanwhile, Danon said BT will continue to extend the areas and the exchanges where standard broadband is available. Because of public demand BT is already upgrading about one exchange a day, he added.

'We are absolutely committed to our target of one million broadband connections by next summer,' said Danon. 'We've [already] had more than 200,000 registrations of interest.' Danon said that BT wouldn't count the new Midband products as part of the company's broadband targets.

Antony Walker, chief executive of the Broadband Stakeholder Group, welcomed BT's moves, calling Midband a good attempt to offer more bandwidth in areas that have no broadband access. 'While this service is not a broadband solution, if you only had a 56Kbit/s modem, you would probably be very happy with it as an alternative to narrowband,' said Walker. *DINAH GREEK*

Government fights off 6,000 online attacks

Cabinet Office hit by 1,000 in October alone

The government has fought off more than 6,500 digital attacks already this year, according to official figures.

The Cabinet Office was subject to 1,167 digital attacks last month, out of 5,857 during the year. Cabinet Office minister Douglas Alexander said: 'None of these resulted in compromise, loss or damage to any information held on the systems.'

The Department for Environment, Food and Rural Affairs has detected 564 attacks so far this year, with 34 in October alone. The department said: 'These attacks were all stopped by our existing security measures.'

The Ministry of Defence (MoD) explained that it was 'subject to widespread and frequent attempts to probe its electronic boundaries', but would not comment on its anti-hacking policies on national security grounds. It has suffered 10 hacking incidents, but the MoD said that 'none of these had any significant impact on the conduct of military operations'.

The figures were released in response to a series of questions by Labour MP for Milton Keynes North East Brian White, who is also chairman of

public sector IT body the European Information Society Group (Eurim).

The Department for International Development claimed its systems had suffered just one digital attack, in October, when the Bugbear virus entered its system and infected 15 of its PCs. Viruses Elkern and Redlof/A hit the department on two other separate occasions, but no hacking attempts were made.

Six virus attacks have affected The Lord Chancellor's Office during the year so far, but none caused damage to its IT systems.

The Department of Transport said the network it shares with the Office of the Deputy Prime Minister had been attacked 266 times in 2002 up to October and eighteen of them were in October.

However, some departments seem to have remained beyond the electronic reach of hackers. The Department of Education and Skills, The Foreign and Commonwealth Office and the Treasury all said there had been no attacks on their systems throughout the year. The Treasury, however, did admit that one external Web site had been attacked while under construction. *STEVE RANGER*



OPINION
GUY KEWNEY

WI-FI BROADBAND

Ordinarily, it wouldn't be important news—that someone has put together a sort of chewing-gum and string imitation of broadband Internet for a rural community. It uses a technology called Wi-Fi, which is supposed to be used for networking an office, but I think it may be a breakthrough.

The idea has been suggested by groups of enthusiasts, but now it's a proven business proposition. Before what's more, it looks like it's working better than most mainstream proposals to run expensive fibre to remote parts of the country.

The main problem with broadband in the UK (and probably several other parts of the world) is money. Nobody has any.

You could go to a cable company and say: 'We don't have broadband in this village, but there are about 120 people who definitely want it in a radius of about 15 miles, which makes it worth your running a cable in, right?' And they'll say: 'Okay,' but they won't do it.

The problem isn't that they doubt the existence of the 120 people (though they

probably do), but that even if they were convinced that all 120 would sign up, they can't talk their bank manager into coughing up the capital required for installation of the cable. Quite the contrary—their bank manager is probably screaming blue murder about problems with existing borrowings

Incumbent telcos of the old-fashioned sort are in a slightly better situation. They don't need vast sums to convert their copper wire to ADSL. They're all saying they do, but this is politics, not finance. If they say they need money, they can get the Government to hand over some of that taxpayer bounty. 'Every school will get broadband' sounds wonderful over the TV microphones in the mouth of a Prime Minister or a Welsh secretary or a development agency.

'We are at the same stage with broadband that we were with electricity in the 19th century,' said Andrew Davies, Welsh Assembly Member for Swansea West and Minister for Economic Development and ICT in Rhodri Morgan's Welsh Government Cabinet. His

point is excellent: broadband isn't a purpose in itself and it's going to be an 'enabler' for a lot of other purposes, which aren't even slightly technological. 'In those days, electricity only provided light and the same company that provided electricity also provided new bulbs when yours died. And, at that time, few people would have said it was going to drive all sorts of things like light and heat,' says Davies. The same applies to broadband.

The message seems to be getting accepted; that you have to get people using broadband, before they understand it. Richard Nuttall, founder of Pipex and now running a new startup, Invisible Networks, is indulging in 'stealth' marketing of broadband, in exactly the way that Davies was recommending.

He runs a low-bandwidth leased line (2Mbit/s) into a community with no broadband. And then, armed with leaflets and a strategy of grass-roots activism, he goes round with local enthusiasts, organising meetings—and whipping up excitement. If he can get a couple of dozen

buyers, he installs a network of inter-linked Wi-Fi masts.

Something similar is happening with Wialess.com, which installs free broadband wireless in pubs. It attracts new customers; if the pub gets three more pints of beer sold a day, it's paid for itself (in fact, it usually does far, far better) and suddenly there's a hotspot where there was no Internet access before.

It's certainly not the 100Mbit/s Ethernet fibre we all dream of, but it's more than enough to justify the installation of the initial infrastructure. And it's much easier to go to the incumbent telcos to invest money when you've got 30 users who are running out of bandwidth and are prepared to pay for more.

We need more of these grass-roots ventures and less Government 'support' for broadband in schools.

When vets and pubs and football clubs start installing their own local Wi-Fi hotspots, they'll find uses for it that none of us ever guessed. That will create demand. That is what will transform society... not any amount of political speeches.



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FIRST LOOKS

WIRELESS | SYSTEMS | MULTI-FORMAT DVD REWRITER

High speed with no wires

► D-Link's AirPlus product range offers low-cost wireless well in advance of the 802.11g standard, but it's not as fast as the forthcoming standard and uses proprietary technology



D-LINK AIRPLUS WIRELESS LAN

Verdict An inexpensive, high throughput wireless LAN solution, although there could be some compatibility issues

⊕ Low price; high throughput rates; strong encryption

● Compatibility issues with existing wireless technologies; Windows drivers only

Fact file

Platform Windows 98/ME/2000/XP

Frequency band 2.4 to 2.4835 GHz

Channels 13

Warranty 3 years RTB for hardware

Contact D-Link • 020-8731 5555
www.dlink.co.uk

Price £169 (ex. VAT) (for an access point and 2 PC Card adapters)

WIRELESS LAN

D-Link's AirPlus product range is an interim high-speed wireless LAN solution while UK users wait for 802.11g compliant 54Mbit/s products, which use the same 2.4GHz frequency as current 11Mbit/s 802.11b products.

AirPlus is fully compatible with these existing 11Mbit/s 802.11b products, but it can also run at a higher theoretical data rate of up to 22Mbit/s. Currently D-Link is one of only two manufacturers supplying this type of equipment, which is based on a proprietary technology.

The main components of the AirPlus range from D-Link are a CardBus PC Card adapter (£39 ex. VAT), as well as an access point (£101 ex. VAT) for connection to your wired LAN. The bundle reviewed here consists of an access point plus two PC Card adapters, sold for £169 (ex. VAT). A PCI adapter for desktop machines is also available for £42 (ex. VAT).

Based on TI's ACX100 wireless chipset, which works in the same 2.4GHz radio spectrum as 802.11b and g, Direct Sequence Spread Spectrum (DSSS) modulation allows compatibility with current 802.11b products and it is Wi-Fi compliant as well. Unfortunately it's highly unlikely that it will be compatible or firmware upgradeable to the proposed 54Mbit/s 802.11g standard.

Recently relaxed licensing restrictions on 802.11a, which runs in a different 5GHz spectrum, may make such equipment worth considering if high data throughput is your primary concern and

you aren't particularly looking for compatibility with the slower 802.11b standard.

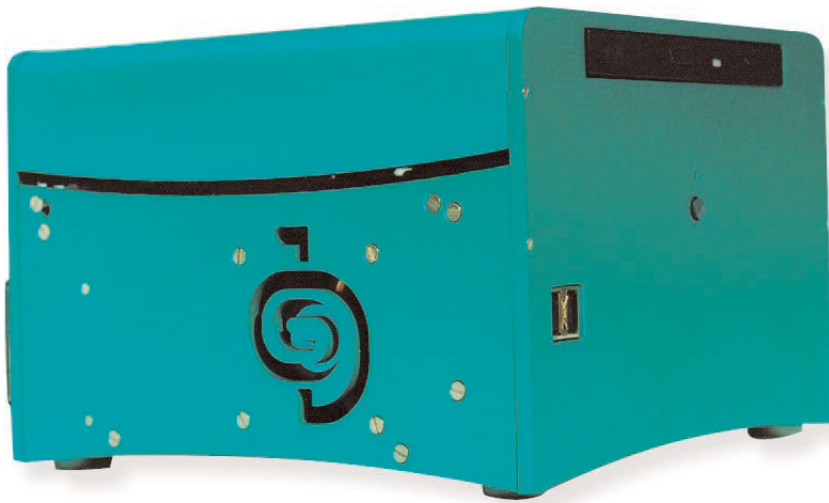
The results of our throughput tests at VNU Labs typically achieved 6.6Mbit/s—this is a 20 per cent increase over the 802.11b products we've seen. But this is achieved using proprietary Packet Binary Convolutional Coding (PBCC) technology, so you'll only see the increase if you're using a homogeneous network of AirPlus products.

There's very little difference in the installation procedure for AirPlus compared with existing 802.11b products, although at present only Windows drivers for the PC Card adapters are available. The access point can be run in four different modes: as a wireless access point, a point-to-point bridge with another access point, as a point-to-multi-point wireless bridge, as a wireless client, or as a wireless repeater. Configuring the access point is done via a Web browser and there's a wizard on hand for speedy installations.

Wireless settings can be manually configured, while a DHCP server automatically allocates client IP addresses if required. Security is based on Wired Equivalence Privacy (WEP) using a 68-bit key with strong 256-bit encryption. Additional access control based on MAC addresses can also be implemented.

This product range is well featured and very well priced. The use of proprietary standards will probably put off larger businesses, although for the small office or home user the extra speed over 802.11b and competitive pricing may make it an attractive option. **ALEX ARIAS**

Individual, compact Brit box



◀ It's not the fastest PC you can buy, but it's stylish and compact. The Netbox Cubit will appeal to those looking for something different



COMPACT PC

It makes a refreshing change to find a PC that's the complete opposite of the standard midi-tower PC most manufacturers offer. Not only is Netbox Cubit tiny, it's hand finished and assembled in dear old blighty.

The Cubit measures a mere 200 by 200 by 150mm and you can choose from either aluminium or Perspex cases. The aluminium models are built to last, as they're constructed from 5mm thick solid metal and tip the scales at a weighty 4.5kg. They're also available in five colours—black, silver, green, red or blue.

The Perspex version, as you might expect, is lighter than the aluminium model, weighing just 3.6kg and comes in Bakelite White, Banana Custard or a smoked glass finish. Netbox will even custom cut a name or logo into one of the side plates for an additional £75 (ex. VAT) charge. The company will also take the machine back for recycling at the end of its working life.

Built around a VIA EPIA Mini-ITX Socket 370 motherboard, the Cubit's powered by VIA's C3-E series CPU rated at 800MHz and 512MB of PC133 SDRAM. So its performance isn't breathtaking, but that's not the point—the Cubit's a stylish and compact alternative for those who want to use their PC in a more visible role, perhaps as the centrepiece of a home entertainment system. It's not a system that would immediately spring to mind for small business use, but it might attract some interest from those looking for a networkable and stylish system for a reception area or showroom. There are three small fans in total—one in the base, one at the side and one CPU fan—so it's not totally silent, but it's quieter than most standard desktop PCs.

The VIA EPIA motherboard is an example of just how much can be fitted into a tiny space. Using the VIA Apollo PLE133 chipset, it provides

integrated 8MB AGP 2X graphics, S-Video and composite video output ports, 10/100Base-T network interface card and integrated AC97 audio. For expansion, there's a single PCI slot, which on the review system was filled by a Motorola V.90 modem with dual RJ-45 ports. It provides support for four USB ports, which on the Cubit are split between the rear and front panels and there's also ATA 100/66 support.

For storage, Netbox supplies the Cubit with a 60GB 7,200 rpm Seagate Barracuda IV hard disk drive and a slimline TEAC DW-224E 24/10/24/8X CD-RW/DVD-ROM combo optical drive. The reviewed Cubit also came with the optional Compact Flash reader installed (£34.66 inc. VAT). An optional ADSL modem (£129 inc. VAT) is also available instead of the V.90 modem, which is supplied as standard.

It's good to see some novel home-grown ideas and Netbox deserves credit for trying to think a little bit 'out of the box'. *SIMON CRISP*

NETBOX CUBIT

Verdict The Cubit is a refreshing new look at the way a PC can step away from the beige box image.

⊕ Small size; fairly quiet; stylish
⊖ Single PCI slot limited; internal expansion capability

Fact file

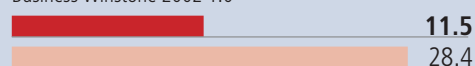
OS	Windows XP Home Edition
Processor	800MHz VIA C3
Memory	512MB of PC133 SDRAM
Graphics	Integrated 2X AGP
Hard disk	60GB
Optical drive	CDRW/ DVD
Display	None
I/O ports	1 x serial, 1 x parallel, 2 x PS/2, 4 x USB 1.1, 1 x 10/100Base-T, 1 x S-Video, 1 x composite video, 2 x modem, 1 x CompactFlash
Contact	Netbox www.Netbox.co.uk (01453) 840171
Price	£687 (ex. VAT)

VNU Labs tests

Netbox Cubit

System performance

Business Winstone 2002 1.0



Reference—Athlon XP2100, 256MB PC2700 RAM, ATI 9000 Pro graphics card, 120GB Western Digital hard disk drive)

The Via C3 processor in the Netbox is equivalent to a Intel Pentium III of the same speed. The performance of the Netbox may look poor compared to the latest Pentium 4s or Athlon XPs but it is still perfectly adequate for everyday business applications.

FIRST LOOKS

WIRELESS | SYSTEMS | MULTI-FORMAT DVD REWRITER

Step closer to DVD solution

► Sony's DRU-500A offers a neat solution to the proliferation of DVD formats currently in use and comes at a competitive price



SONY DRU-500A DVD+RW/-RW REWRITER

Verdict If rewriteable DVD formats are driving you crazy, this ground-breaking drive could be just the antidote you need

⊕ Multiple-format support; comprehensive software bundle
 ⊖ No DVD-RAM support; software lacks advanced features

Fact file

Interface Ultra ATA/33

Internal buffer size 8MB

Write speed 2.4X CAV (DVD+R), 4X CAV (DVD-R), 24X Z-CLV (CD-R)

Rewrite speed 2.4X CAV (DVD+RW), 2X CAV (DVD-RW), 10X CAV (CD-RW)

Read speed 8X CAV (DVD-ROM), 32X CAV (CD-ROM)

Random access time 160ms (CD-ROM), 200ms (DVD-ROM)

Buffer under-run protection Power-Burn

Bundled software RecordNow, ShowBiz, DLA, MyDVD, PowerDVD, Simple Backup, Jukebox

Contact Dabs.com • www.dabs.com

Price £212 (ex. VAT)

DVD+RW/-RW REWRITER

The alphabet soup of recordable and rewriteable DVD formats is enough to give anyone a headache (see Kelvyn Taylor's column in *PC Magazine's* November e-book). Hope is on the horizon, however, and Sony's latest offering, the DRU-500A, may be the first step towards rationalisation. Sony is a member of both the DVD Forum (promoting DVD-R/RW/RAM) and the DVD Alliance (DVD+R/RW), so is ideally placed to launch a product like the DRU-500A, which is compatible with the +R/RW and -R/RW standards. However, it doesn't support DVD-RAM.

The internal drive reviewed here is the full retail model, bundled with everything you'll need to get started creating DVDs. This includes a standard 40-conductor E-IDE cable, mounting screws and a blank Sony DVD+RW disc.

A half-hearted attempt has been made to give it a bit of style, with a silver-painted disc tray fascia covered with clear plastic. On the front panel there's just a single (and rather uninformative) orange status LED and an eject button—there are no transport controls or even a headphone output. At the rear there's a standard jumper block for master/slave configuration. Installation is straightforward, with the hardware and software quick-start guides printed on two poster-sized documents. You'll need to load the supplied RecordNow software in order to record to DVDs—there's no native support in Windows XP

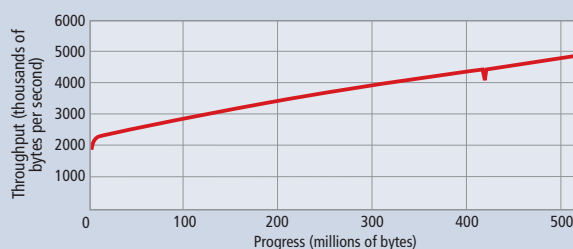
for any DVD rewriteable format apart from DVD-RAM. Although on the installation CD-ROM there's an Internet link for you to download Veritas' DLA packet-writing software, at the time of review this software was still reported as 'unavailable'. The other software includes DVD-Video authoring, video editing, backup, MPEG-2 decoder and music player applications.

All the bundled titles are, however, fairly low-end products. RecordNow has a very confusing and uninformative interface, but we eventually managed to put just over 4GB of data onto a DVD+RW in less than 30 minutes. Reading this media on other DVD drives is, as ever, a bit of a lottery—we found that on a sample of new DVD rewriters in VNU Labs it worked fine, but on older DVD-ROM drives it was a lot fussier. As with any recordable/rewriteable optical discs, you can only guarantee compatibility with the drive that you created the disc on. Using DVD-R/+R media is probably a safer and cheaper option if you're planning to use the media elsewhere. Sony doesn't provide a list of compatible media, so you'll have to experiment yourself or stick with Sony's own brand. There is an addendum in the manual highlighting known problems with a specific batch of Verbatim 2X DVD-R media.

The DRU-500A is an innovative effort from Sony and it's competitively priced compared to single-format models. If you're fed up with trying to decide which rewriteable DVD format to go for, it's the ideal solution. *KELVYN TAYLOR*

VNU Labs tests

Sony DRU-500A—CD Winbench 99 transfer rate



CD-ROM read performance of the DRU-500A is smooth across the entire test CD-ROM, with only a minor drop-out towards the outer edge of the disc. The maximum transfer rate is just under 5 million bytes per second, which represents close to the rated 32X (CAV) maximum performance.

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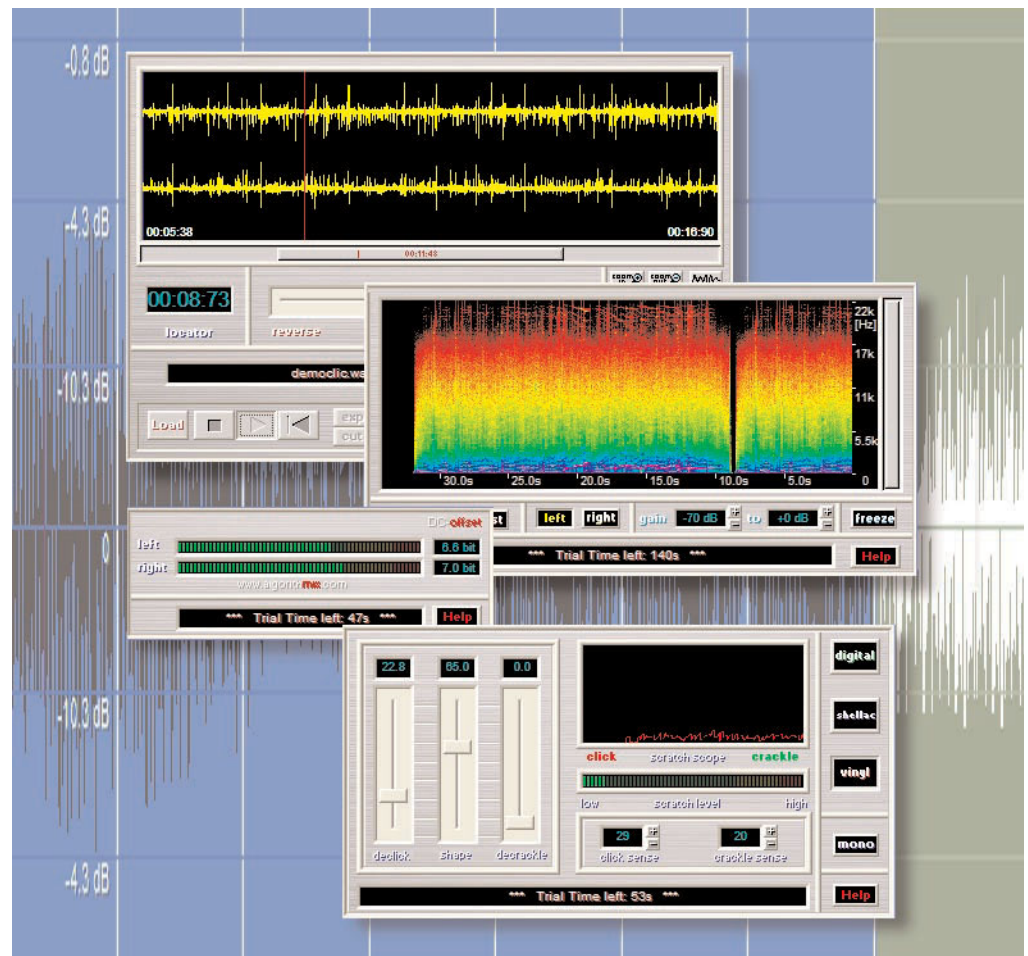
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AUDIO RESTORATION

INTRO | GETTING STARTED | RECORDING | COPYRIGHT | TRANSFERRING | OPINION



Sound investment

HIGHLIGHTS

- We look at the **software and hardware** needed to get the best possible recording
- The featured software lets you to **record and restore the music** from your old LPs as well as write them to CDs
- We look at eight different software packages, some of which allow you to **record, restore and transfer your music** from vinyl LP to CD

One hobby ideally suited to modern high-powered PCs is the process of digitising your old music collections. It's now a relatively simple process to rediscover and archive all those LPs or cassette tapes you haven't listened to for years. Here we investigate the latest techniques and tools available to let you ditch your old vinyl LPs and cassettes—subject to getting copyright permission, of course

By the end of the 1980s many pundits were convinced that we'd seen the end of music on vinyl. Having grown up with it, it had been superseded by the new CD technology that offered supposedly better quality sound in a small compact format. It seemed that the days of lugging around bulky records had passed. The demise of the old LP didn't mean that it disappeared, though.

Although CD manufacturers teased and tempted consumers with re-issued CDs that had been digitally re-mastered, many people still kept hold of their LP collections, for sentimental value if nothing else. But this doesn't mean that the music on them should be locked away. With the advent of fast processors, vastly improved sound cards and affordable CD writers, it's never been easier (or more afford-

able) to transfer all that old music (and at the same time get rid of all the pops, crackles and clicks) from LPs or cassettes onto recordable CDs. You can even clean up poor quality MP3 or WMA files.

We've rounded up a selection of software and hardware tools and explain what you'll need to do to make the results as good as possible.

There are several things you should remember when attempting to record your old LPs to your PC. And don't expect to do your whole collection in one afternoon—read about Kelvyn Taylor's experiences on page 20 to see some of the possible reasons why.

If the idea of archiving your old music collection is something that appeals to you then you'll find something here to spur you into action—as long as you didn't throw away your turntable when you bought your CD player! **HENRY TUCKER**

Technical editor Henry Tucker
Additional contributor Kelvyn Taylor

GETTING STARTED

▶ Working with music files can put great strains on most of the subsystems of your PC, so although you may be able to get away with using an older system, its limitations will soon hinder your progress. The faster your PC, the more you're likely to stick with it and actually achieve something.

The key components to ease the process are the CPU and hard disk drive. Much modern audio software is coded to take advantage of the capabilities of the Pentium 4 and/or AMD Athlon XP architectures. At the very least we'd suggest a 900MHz Pentium III and 128MB of RAM—filtering WAV files and adding effects is very CPU-intensive, which is one reason that it's only recently become possible for amateurs to even think of attempting this type of work. You'll also need a sound card capable of recording 16-bit, 44KHz audio with a line level input—modern onboard sound solutions should be okay. A large, fast hard disk drive is also a good idea—a 40 minute WAV file takes up around 500MB of disk space. Working in a 'batch mode' is often most efficient—recording a few albums straight to disk and then cleaning them up later. For this you'll need plenty of space or a suitable backup/archiving solution. Graphics capabilities aren't too critical.

Making that connection

The next thing you need to sort out is how to connect your turntable or cassette deck to your PC. The simplest way is to connect a line level output (sometimes marked as the 'tape out' connector) from your audio amplifier direct to the line input (not the microphone input) of your sound card. If your amplifier doesn't have either option, you could use the headphone output, but be sure to keep the volume very low or you may damage the sound card's inputs. If you're recording from LPs you can use a turntable directly, but you'll need a dedicated phono preamplifier (typically around £20 to £30) connected to the turntable and then to the sound card's line input. Make sure you earth the turntable to the PC's chassis, otherwise you'll get mains interference.

There are several packages available that offer a more or less complete hardware and software solution, which we'll briefly look at here. One package designed to do just that is Terratec's Phono PreAmp Studio (£69.99 inc. vat). This is a combination of a phono preamplifier plus a bundle of audio restoration software. The preamplifier is about the size of your palm and is powered from the PC's game port. There's a pass-through game port on the unit so you can still use it for gaming devices. It has a 3.5mm, stereo mini-jack to plug in to the sound card and twin phono inputs for the turntable. In order to match a range of turntable/cartridge combinations, two switches allow you to adjust the input capacitance and output level. There are three input capacitance levels (100pF, 250pF and 425pF) that should

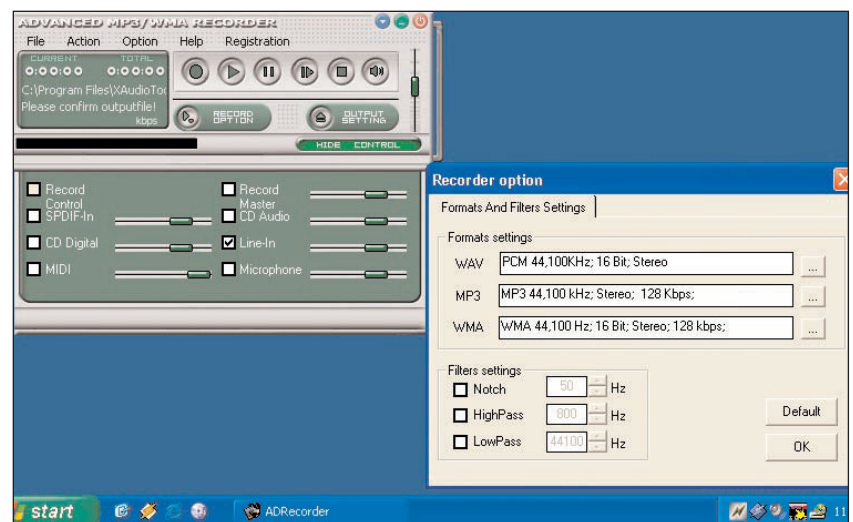
be set to correspond to that of your phono cartridge. The output level switch simply has three settings of Min, Mid and Max, which correspond to 300mV, 550mV and 1,100mV. This package comes with a copy of Algorithmix's **Sound Laundry** software that includes a DeScratcher and a DeNoiser, plus a large bundle of shareware audio tools, but there's no dedicated CD-writing software.

If you're starting from scratch, an all-in-one package to consider is the **DSP 24 Media 7.1 (£229.99 inc. vat)** from ST Audio. This consists of a 24-bit/96KHz PCI full duplex soundcard plus an external 9.5in. interface box. The interface box has a full range of analogue and digital audio I/O connectors and also has an integrated phono preamplifier, making it an ideal solution for recording LPs. Along with the hardware there's an extensive software package including **DC-Art32 4.0** and there are also drivers for Mac OS X. With 7.1 multichannel analogue outputs plus MIDI input and output this is a solution for the serious user.

Another product designed for this market is **Clean Plus 4.0 (£46.99 inc. vat)** by Steinberg. Similar in some ways to Phono PreAmp Studio, it's a dedicated audio cleaning package with a bundled USB phono preamplifier. This is relatively small and is made of a stylish silver-coloured plastic. As with the Terratec unit, it has stereo phono inputs and controls for setting the input and output levels plus a single 3.5mm mini-jack for connecting to the line input of your sound card.

Clean Plus 4.0 is a full suite based around Wave-Lab Lite 2.5 for grabbing the music, you can then clean out any noise with its AutoClean functionality, which includes de-clicking, de-crackling, de-noising and de-rumbling, as well as adding effects to the tracks. It then gives you the option to transfer the music to a CD, although your CD-RW drive needs to support Disc-At-Once (DAO) mode. ➔

▶ **Advanced MP3/WMA Recorder**
A utility that allows you to record directly from an LP or cassette to files in MP3 or WMA format



AUDIO RESTORATION

INTRO | GETTING STARTED | RECORDING | COPYRIGHT | TRANSFERRING | OPINION

RECORDING AND CLEANING

Once you've got your source connected, the first task is to record the sound that's coming into your PC. You might think that the built-in sound recorder that you get with Windows would be suitable—it isn't. It doesn't record sound directly to hard disk, so recording length is limited by memory (about 10MB per minute). The best approach is to use a dedicated wave recorder/editor that records directly to the hard disk drive.

One of the many that you can download from the Internet is the **Advanced MP3/WMA recorder** by XAudiotools (www.xaudiotools.com). The limited version of the software is free to try, but it **costs \$29.95 to register for the full version**. The download version limits you to the length of time that you can record in one go, but apart from that you have the same functionality as the full package. Its main attraction is the ability to record direct to MP3 or Windows Media Audio (WMA) formats, as apart from that it's not a particularly powerful recorder. There's only a small single-bar VU recording level meter, which is very slow to respond, making it difficult to check whether you've set the input level correctly. You can't set the left and right channel record levels separately and there's no wave editor included.

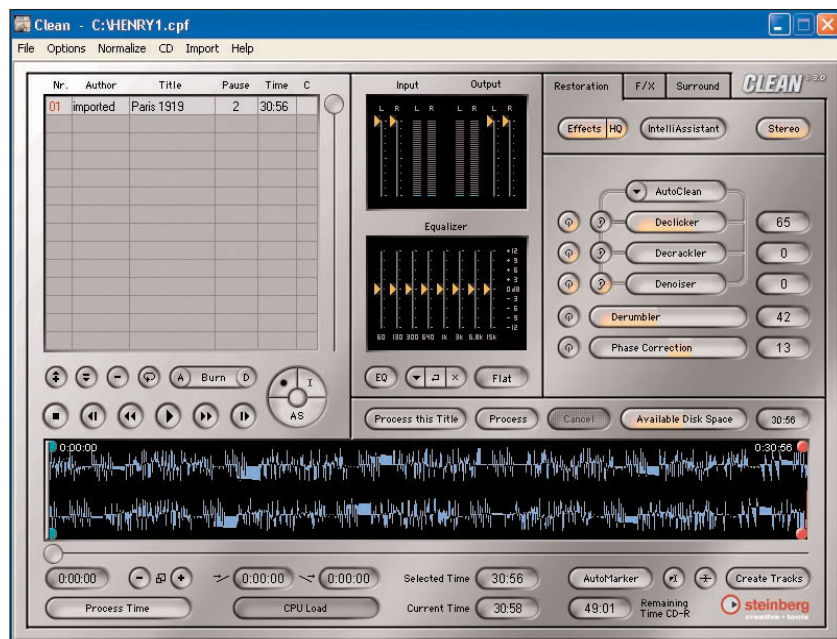
A much better shareware application, which has been written specifically for vinyl restoration, is **Wave Repair 4.85 (\$30)** and is available from www.waverepair.com for a 30-day evaluation. It's freeware if you just want to use it for WAV recording and track splitting. After 30 days you won't be able to save any changes you make to files, but the freeware functionality is unaffected. Wave Repair's main attraction is its very accurate recording metering—there's a large, clear recording level meter which displays peak level readings both numerically and graphically. The record level sliders allow panning (setting left and right channels independently) and you can set a timed record delay. If your sound card driver supports the Windows Mixer API, you can also choose the recording source from here. Once you've recorded your WAV file there's a full set of powerful restoration and filtering features—but be warned, if you're unfamiliar with wave editing it's worth reading the well-written help files first. It's not really a beginner's package, but the default settings for most tools do a good job and help get you started. If you find it too daunting, it's still worth using simply to record your wave files before cleaning them up in another package. You'll also need separate software for recording to CD as Wave Repair won't do this for you.

When it comes to cleaning up your tracks, a very useful and reasonably priced package is **Audio Cleaning Lab Deluxe 3.0 (£29.99 inc. VAT)** by Magix (www.magix.com). The software has been specifically designed for recording, restoring tracks and then transferring them to CD and comes with a dual phono to 3.5mm mini-jack cable and headphone adapter so you can connect your hi-fi to your PC. This isn't a high-quality cable, but it's good enough to get you started.

When you launch the software for the first time it gives you the option of viewing two excellent training videos. The first video shows you how to connect your hardware to your PC and the second offers a complete overview of how to use the various



▲ **Audio Cleaning Lab 3.0 Deluxe** Although its interface is eccentrically designed, this package offers an impressive set of audio restoration capabilities for the price



▲ **Clean plus 3.0** While you're restoring your tracks, Clean Plus lets you know how much time is remaining on your CD-R drive, as well as the CPU load

➔ **Feel strongly about copyright issues?** Add your comments on the *PC Magazine* forum at www.pcmag.co.uk

AUDIO RESTORATION

INTRO | GETTING STARTED | RECORDING | COPYRIGHT | TRANSFERRING | OPINION

Copyrights and wrongs

Transferring your music collection from vinyl and tape to PC and then CD sounds like a great idea, but does engaging in this activity, even in the privacy of your own home, turn you into a dangerous criminal?

Some of you may be concerned about the legality of copying your music collection via your PC to CD.

Unfortunately UK copyright law makes no special provisions for copying audio works for personal use—it does allow for backup copies of software (a provision also usually included in software licence agreements), but there's no similar exception for audio materials. Under the provisions of the Copyright, Designs and Patents Act 1988, the act of copying a copyrighted audio recording is in itself an infringement of copyright. The sale and/or distribution of such copies are separate infringements. This is unlike broadcast audio/visual programmes, where there is an exception granted for the recording of such programmes for the sole purpose of viewing or listening to them at a

more convenient time (referred to as the 'time-shifting' exception).

The problem is that it's impossible to police personal copying and the majority of people in the UK have probably infringed these laws at some time. Whether it's just copying a CD or LP to cassette, or trying to preserve a now-unobtainable LP that's not available on CD, most of us must be guilty. And if you want to do it completely legally, there's no simple mechanism apart from contacting the copyright holder directly for permission. There is no 'fair use' provision in UK law for private individuals who want to transfer recordings between different types of media. The Consumers Association is campaigning to allow home copying for private use, on the basis that it's ridiculous that whole industries (manufacturers of MP3

players and CD writers, for example) are based around individuals performing illegal acts. And even if you've bought a legal MP3 file, what if your PC's hard drive decides to trash it? The answer depends on where you got it from—different commercial MP3 sites attach different terms to downloaded music, but most allow copying for personal use.

To muddy the waters even further, the UK is about to implement changes to the law in order to incorporate the EU Copyright Directive (see www.patent.gov.uk/about/consultations/eccopyright/). This doesn't have any provisions that will affect the current illegal status of home copying, but there are some other issues related to copy protection technologies. You can read more about these at the UK Campaign for Digital Rights <http://ukcdr.org>. **KELVYN TAYLOR**

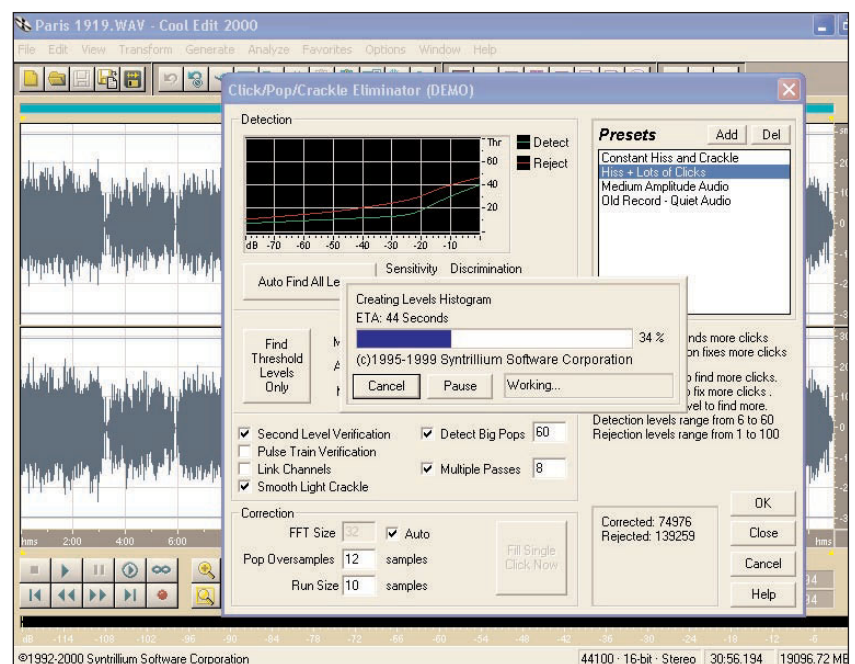
parts of the software. Both are well worth watching if you haven't done this sort of thing before.

The interface is rather eccentrically designed, but it is very clear and dominated by three numbered tabs labelled Import, Cleaning and Export. Import can be done from file, CD or via the rather unimpressive wave recorder (although it does support 24-bit recording with a suitable sound card). Confusingly, there's also a fully featured separate wave editor, which can be launched from the main interface. The Cleaning tab brings up a whole batch of tools that you can either use in preset or manual mode, plus there are cleaning and effects wizards, which attempt to do the job automatically for you. The range of tools on offer and its ease of use make Cleaning Lab Deluxe an impressive package, especially considering its price.

We mentioned Steinberg's **Clean Plus 4.0 (£29.99 ex. VAT)** in the 'Getting Started' section (see page 15). Clean Plus 4.0 has four restoration features: a de-clicker, a de-crackler, a de-noiser and a de-rumbler as well as phase correction. If you're unsure how to use these features, it does have an IntelliAssistant wizard that can automatically set the levels for you after the track has been scanned. It's a fairly competent package, but not as fully featured or powerful as Audio Cleaning Lab Deluxe 3.0.

Cool Edit 2000 (\$69 to download) by Syntrillium is one of the most popular music software applications for the PC. You can use it to turn your PC into a recording studio and you can use it to record your music from almost any source and then edit and mix it as you wish. One of its best features, though, is its plug-in support—software modules

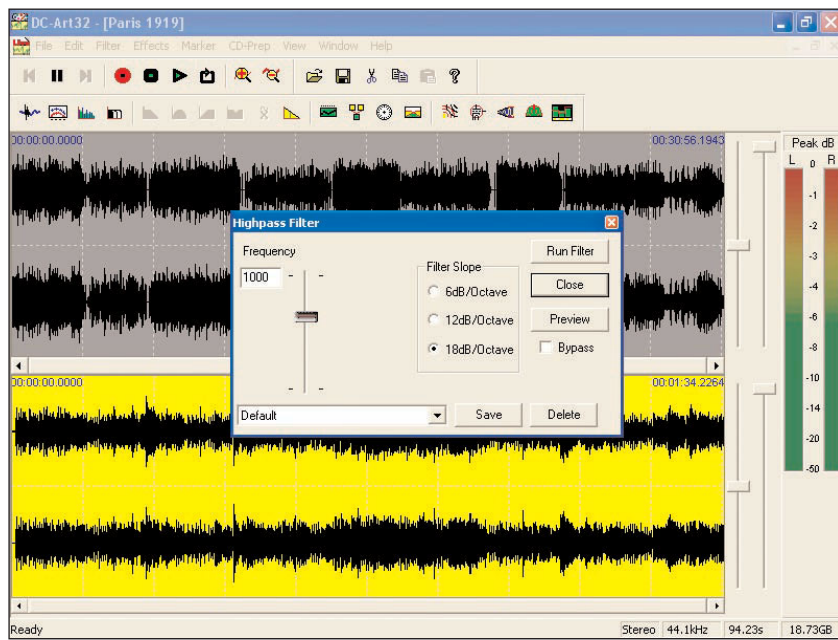
that add functionality. One of these is an Audio CleanUp Plug-In. So along with all the existing features you can also use it to restore your LPs and then transfer them to CD or convert them to MP3. The plug-in does cost an extra \$49 but, along with the main application, it can be downloaded directly from Syntrillium's Web site at www.syntrillium.com. It has several options to remove pops and clicks and restore clips where the maximum record level has



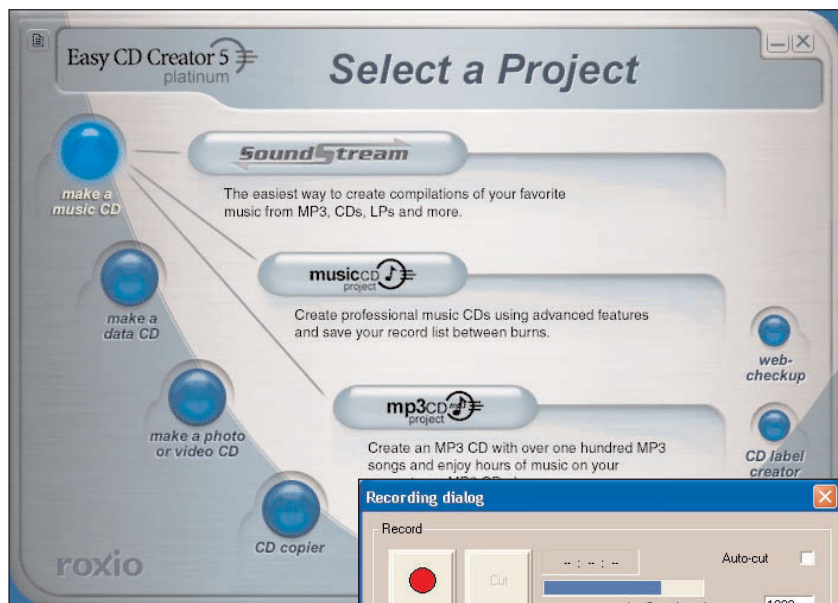
▲ **CoolEdit 2000** Although the CleanUp function is only available as an additional plug-in for CoolEdit 2000 it does make for a good all-round music package

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▲ DC-Art32 4.0 Although some of the settings aren't that obvious if you're new to the program, DC-Art32 4.0's supplied help file will tell you all you need to know



▶▶ Easy CD Creator 5 Platinum has three different options for recording audio CDs

been exceeded as well as hiss reduction and noise reduction that removes any constant noises that occur in the track, such as background noise. All the tools have lots of settings so that you can achieve your desired effect. They also all have useful help guides for each section.

Cool Edit 2000 works well, but it's really a music editing suite that you can add a cleaning utility to, so unless you want both you will probably be better served by another product.

Diamond Cut Millennium (\$99, order online) from Diamond Cut Productions is a restoration and CD mastering tool for advanced users. A demo version, limited to 60-second audio files, can be downloaded from www.diamondcut.com. Almost unfathomable if you're a beginner, it makes scant few concessions in either the interface or the help system, although the numerous tools do have default settings to help you if you're not sure how to set them up. There's a special section of the help file devoted to audio restoration, which guides you through restoration of a demo file, but, in general, the help file is aimed at the more experienced user. This is a package you might grow into after many hours of experience with more basic packages, but it's not a good for novices.

Of the tools mentioned here, if you're starting out and don't want to spend too much, we'd recommend Audio Cleaning Lab Deluxe 3.0, used in conjunction with the freeware features of Wave Repair for making the original recordings. As you progress and become more confident, you could start to use the more advanced features of Wave Repair (editing out individual clicks, for example), by which time you'll know what features you need, so you can choose the package that best suits your needs.

TRANSFERRING YOUR AUDIO RECORDINGS TO CD

▶ After you've recorded your music and made any changes you want to the tracks, you can then decide exactly what you're going to do with them. You could choose to leave them as they are (usually in WAV format), but it's better to either transfer them to CD or to encode them to MP3.

If you've recorded your music as WAV files you'll be aware just how big they are. Converting them to MP3 files dramatically reduces the file size, albeit with some lack of quality due to the lossy MPEG-2 compression algorithms. Alternatively you can maintain more of the original recording's quality by creating a standard audio CD from the WAV files—this is the recommended route if you're simply archiving old vinyl recordings. However, you

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should also retain backups of the original untouched WAV files for future use—wave editing is usually destructive and if you're not completely happy with the final result it's back to the turntable.

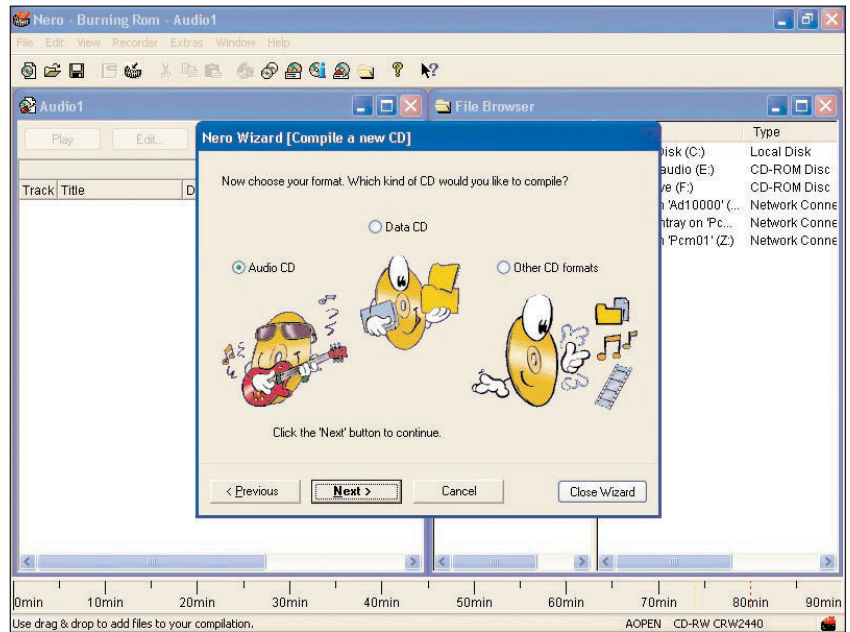
If you want to make audio CDs of your tracks then you'll need some form of CD creation software—some of the all-in-one packages we've looked at in other sections offer this facility, but others don't. If you're running Windows XP Home or Professional you can simply use the built-in audio CD creation features of **Windows Media Player**. When you explore a folder containing audio files, there will be a 'Copy all items to audio CD' menu option in the task pane. Clicking on this opens Windows Media Player with the files ready to be copied—simply insert a blank writeable CD and hit the Copy button. Alternatively, you can right click a file or selection and choose Copy to Audio CD from the context menu, which again will launch Media Player. Media Player will cope with mixtures of file types—so if you have some WAV files and some MP3/WMA files it will automatically do the conversions before committing them to CD. Although Windows XP's support for audio CD creation is very useful, it does have its limitations. It doesn't support the creation of CD Text, for example. And if you're still running Windows 95 or 98 you'll definitely need a third-party software package.

Even if you have Windows XP, advanced users should consider investing in a separate CD recording package, such as **Roxio's Easy CD Creator 5 Platinum (£44.99 inc. vat)**. This is a comprehensive bundle of most of the utilities you'll need to create data and audio CDs, plus it also includes some useful audio recording and restoration tools. The Sound Editor module allow you to record WAV files and Spin Doctor offers some basic filters for removing clicks and hiss, but you don't have the level of control offered by some of the standalone editing/cleaning packages reviewed elsewhere in this feature ('Recording and cleaning' on page 16).

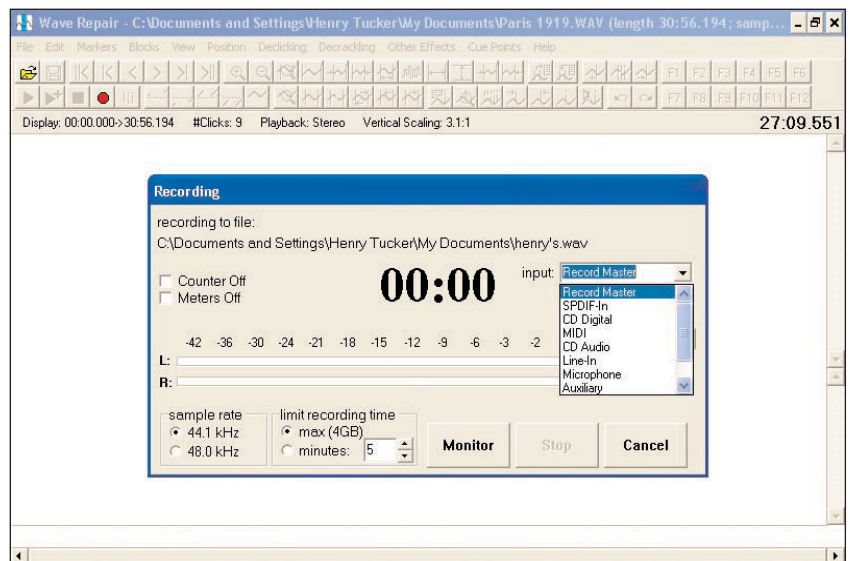
The SoundStream 2 module with Easy CD Creator is a wizard-driven interface that allows you to record and clean up tracks—it can also record direct to CD. Track normalisation lets you balance the volume of tracks recorded from different sources. If you're creating an MP3 CD there's a wizard and built-in MP3 encoder specifically for this purpose. You can also add CD Text for use in domestic players that support this feature.

If you're looking for a versatile one-stop CD recording package, then Easy CD Creator 5 Platinum is certainly worth investigating, especially as earlier incompatibility problems with Windows XP now appear to have been overcome.

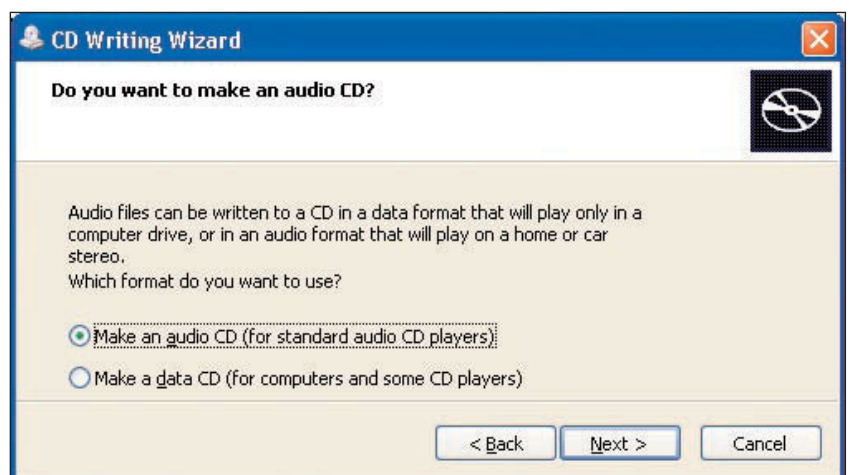
Another all-in-one package is **Nero Burning ROM 5.5.9.17 (\$49 download, 12MB)** from Ahead Software (www.nero.com), which is available as a fully featured trial download. This package has many similar features to its chief competitor, Easy CD Creator 5 Platinum. As well as the standard audio and data CD creation tools, there's an MP3 encoder, Video CD creation software and a filtering/equalisation module that's fine for basic use. It



▲ **Nero Burning ROM 5.5.9.0** This package gives you the option of creating an audio or data CD and it also offers the facility add effects between tracks



▲ **Wave Repair** gives you the option selecting your music input



▲ **Windows Media Player** With Windows XP Home or Professional you can create audio or data CDs without resorting to additional software, but features are limited

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also has a click/hiss removal tool, but again it's fairly basic. The WAV editor is easier to use than Roxio's, but the recording facilities for both packages are no match for the standalone products. There's not much to choose between Nero and Easy CD Creator in terms of price or functionality, although the availability of a trial version of Nero is a definite bonus.

If you're doing a lot of audio restoration, you'll probably opt for a collection of tools that you find the easiest to use or are the best for a particular task. If you're just dabbling, starting off with one of the all-in-one packages (which are often bundled free with drives) is the best way to get an idea of what you can achieve before spending any more cash. ■

OPINION
KELVYN TAYLOR

JUST DON'T DO IT

You've been warned. It might seem like a good idea but, from personal experience, I can tell you that launching into a project to archive your LPs to CD isn't something you should do if you value your sanity or your wallet.

It all started when my trusty old hi-fi cabinet fell apart (well, they usually do when you drop them and, no, I'm not expanding that story any further), scattering my vinyl collection all over the floor. Storage suddenly became a problem, especially after I discovered the price of a replacement piece of furniture. So I thought: I'll just copy them all to my PC, burn them on to CD-Rs and the problem's solved.

Coincidentally, I'd just acquired a copy of Audio Cleaning Lab Deluxe, supposedly designed for just this purpose, so in I jumped.

The first problem came when I realised my antiquated audio system didn't

have a line output. Luckily, Audio Cleaning Lab comes with an adapter for the headphone socket so I tried that (any audiophiles reading this are advised to stop now).

That's when I discovered how awful the integrated sound card on my PC was—even reducing the headphone volume to its lowest level was swamping the line input. As often happens, one thing led to another and I'd soon spent a few hundred pounds on a shiny new integrated amplifier and CD player. Didn't I tell you I didn't have one? Actually I bought a DVD player first, intending to kill two birds with one stone, but found it wouldn't play CD-Rs. These new acquisitions made my old speakers sound awful, so I replaced them as well. All this was done under the cover of darkness and explained away to my wife as probable poltergeists.

The plan was to use the tape output from the ampli-

fier to give me a decent clean signal. Except that it also swamped the sound card's line input so I was back to using the headphone socket. At least I could get it down to a sensible level now, so I started dusting off the LPs.

That's when I realised that I'd never actually listened to many of my LPs all the way through; you can't wander off while you're recording unless you have concrete floors and/or a PC that never crashes. My newest album is dated 1976 and there's a definite limit to nostalgia.

Anyway, having eventually got an LP onto the PC—a new hard drive was also looking increasingly attractive as a single album takes up about 500MB—I started the restoration process. I can now reveal that the first thing you should do when you've made a successful recording is to archive it to a CD-R or a spare hard drive. Believe me, you won't regret it after you've

mangled up the original with a dodgy wave editor with no undo facility.

Getting rid of clicks and crackles is worthy of a whole feature by itself. Suffice to say that I'm glad Audio Cleaning Lab is non-destructive to the original WAV file; unless you're as daft as I am and try menu options without reading the manual first. I actually found the shareware utility Wave Repair the best for this job, but whatever you use it will take you hours. I reasoned my new Pentium 4 CPU was a good long-term investment.

Then came the CD burning process. My old 8-speed writer was taking far too long, so a 32-speed seemed like a good idea. Except that it's very noisy and scares the cat. No matter, after several weeks of effort I've now got a couple of cleaned-up LPs transferred to a shiny new CD-Rs. Now for the other 58!

KELVYN_TAYLOR@VNU.CO.UK

Contact details

Product	Company	Tel	URL
Advanced MP3/WMA recorder	Xaudiotools	n/a	www.xaudiotools.com
Audio Cleaning Lab Deluxe 3.0	Magix	(01923) 495496	www.fasttrak.co.uk
Clean Plus 4.0	Steinberg	020-8970 1909	www.steinberguk.com
Cool Edit 2000	Syntrillium	n/a	www.syntrillium.com
DC-Art32 4.0	Tracer Technologies	n/a	www.tracertek.com
DSP 24 Media 7.1	ST Audio	(0870) 873 8731	www.etcetera.co.uk
Easy CD Creator 5 Platinum	Roxio	n/a	www.roxio.de/english
MP3 Maker Platinum	Magix	(01923) 495496	www.fasttrak.co.uk
Phono PreAmp Studio	Terratec	(0118) 982 1612	www.terratec.co.uk
Nero 5.5.9.0	Ahead	n/a	www.nero.com
Wave Repair	Wave Repair	n/a	www.waverepair.com

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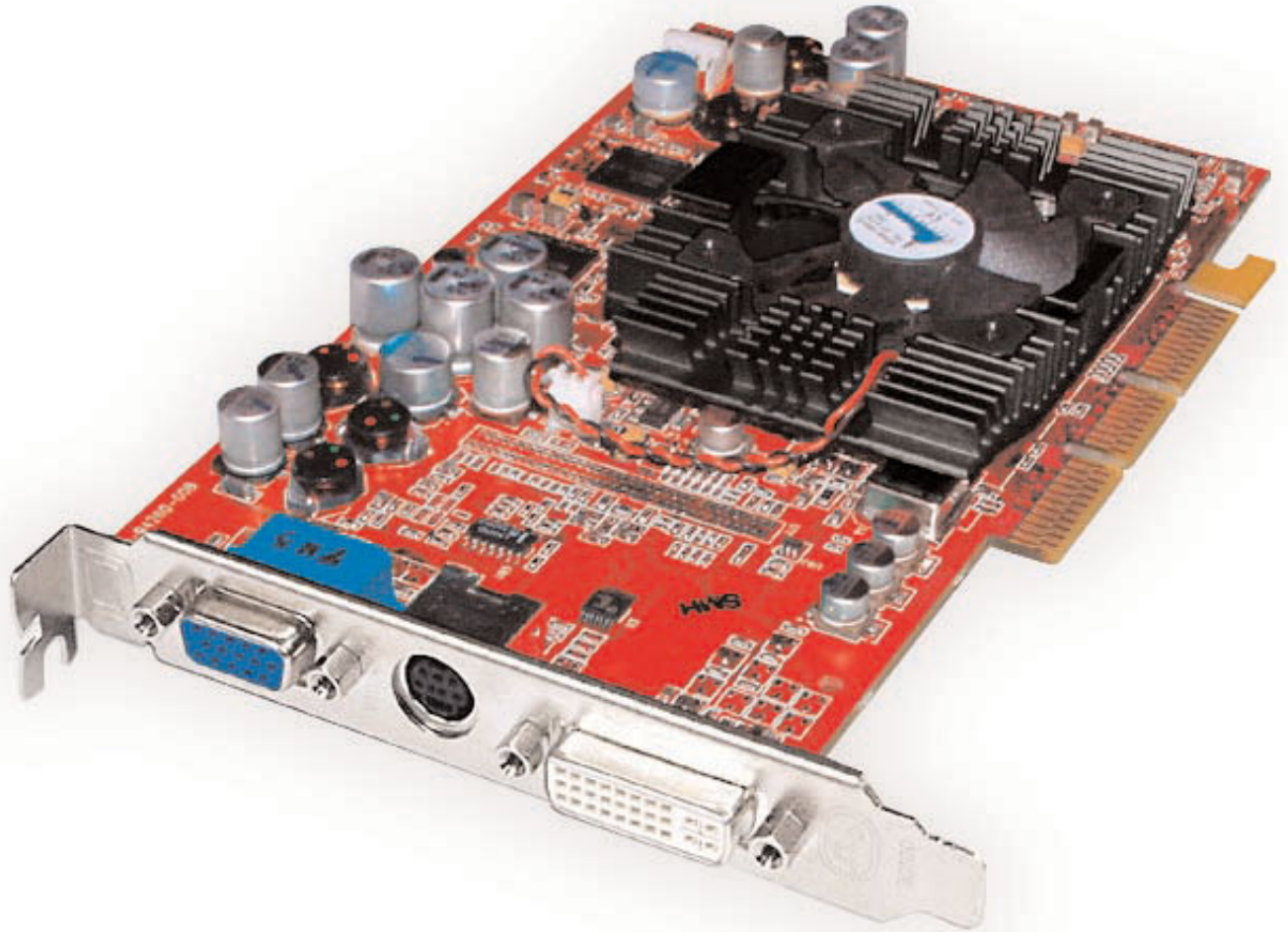
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ATI RADEON 9700 PRO

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ATI Radeon 9700 Pro



HIGHLIGHTS

- New rendering architecture offers eight pixel pipelines
- DirectX 9.0 is fully supported and offers improved pixel and vertex shaders
- SmoothVision 2.0 brings multi-sample anti-aliasing

With its latest 3D graphics chipset, ATI has once more joined the leading edge of 3D technology. But just what makes this chip so special? *Laurence Grayson* examines why OEMs are lining up to manufacture their own Radeon-based products.

It's been a while since ATI produced cutting-edge 3D graphics performance, but that's exactly what it's doing right now. With a radically altered manufacturing model, third-party companies now have the option to build ATI-driven boards. The end result is that OEMs are lining up to create their own Radeon-based products and much of this is due to the new Radeon 9700 Pro chipset, easily the fastest and most feature-laden 3D graphics chip available for the PC.

The Radeon 9700 Pro chipset is large and extremely complex. Previously known as the R300, it's made up of over 107 million transistors and is based on a 0.15-micron die in a flip-chip package. To give you some idea of scale, a 1.6GHz Northwood Pentium 4 CPU, using a 0.13-micron process, contains only 55 million transistors. As a result, ATI and subsidiary chip design company ArtX have had to

make some allowances for size, specifically an 8-layer printed circuit board for the chip to sit on and an external power connector to overcome the AGP slot's power limitations—similar to that found on old 3dfx Voodoo5 boards. In fact, the plan was originally to use a 10-layer PCB, but this would have seriously limited the ability of third-party manufacturers to build their own Radeon 9700 parts.

Like Matrox's Parhelia chip, the Radeon 9700 Pro can address up to 256MB of video RAM and uses a 256-bit memory interface with a crossbar controller comprised of four independent 64-bit memory units (see Figure 1 opposite). With DDR-SDRAM memory clocked at 310MHz, this gives the Radeon 9700 Pro a massive peak bandwidth of nearly 19GB/s (256 bits/8 x 2 x 310,000,000 equals 19,840,000,000 bytes or 18.5GB), ignoring issues like load balancing and latency. The Radeon chipset

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◀ Microsoft's DirectX 9.0 API ups the ante with support for higher order surfaces and advanced pixel and vertex shaders

Microsoft's DirectX 9.0 API compared

	DX8.0	DX8.1	DX9
Higher order surfaces	●	●	●
N-Patches (TruForm)	●	●	●
Continuous tessellation	○	○	●
Displacement mapping	○	○	●
Vertex shaders versions	1.1	1.1	2.0
Maximum instructions	128	128	1,024
Maximum constants	96	96	256
Flow control	No	○	●
Pixel shaders versions	1.1	1.4	2.0
Texture maps	4	6	16
Maximum texture instructions	4	8	32
Maximum colour instructions	8	8	64
Data type	integer	integer	floating point
Data precision	32bits	48 bits	128 bits

also supports DDR II SDRAM, but we'll see this first on nVidia's next product.

But what makes the 9700 Pro truly groundbreaking is the new rendering architecture, which now offers a total of eight parallel pixel rendering pipelines compared to the four of previous boards, such as nVidia's top-end GeForce4 Ti 4600. These boards are all floating-point capable and in line with the 64- and 128-bit RGBA colour specification of Microsoft's DirectX 9.0 (DX9). In fact, the entire product was created to match the DirectGraphics requirements of this API (see Table 1 above), including support for higher order surfaces and advanced pixel and vertex Shaders.

This combination of pixel pipelines and a core speed of 325MHz (the non-'Pro' part is clocked at 300MHz) amounts to an impressive 2.6Gigapixel/s peak fill rate—over twice that of nVidia's GeForce4 Ti 4600. But ATI has broken from the trend for multiple texture units per pipe, leaving the Radeon 9700 Pro with the same figure for texel operations per cycle. Though this may appear to put this chipset at a disadvantage to products with multiple texture units, it hasn't been done without reason. Quite simply, even the impressive bandwidth of this product would struggle to support 16 texture units. For

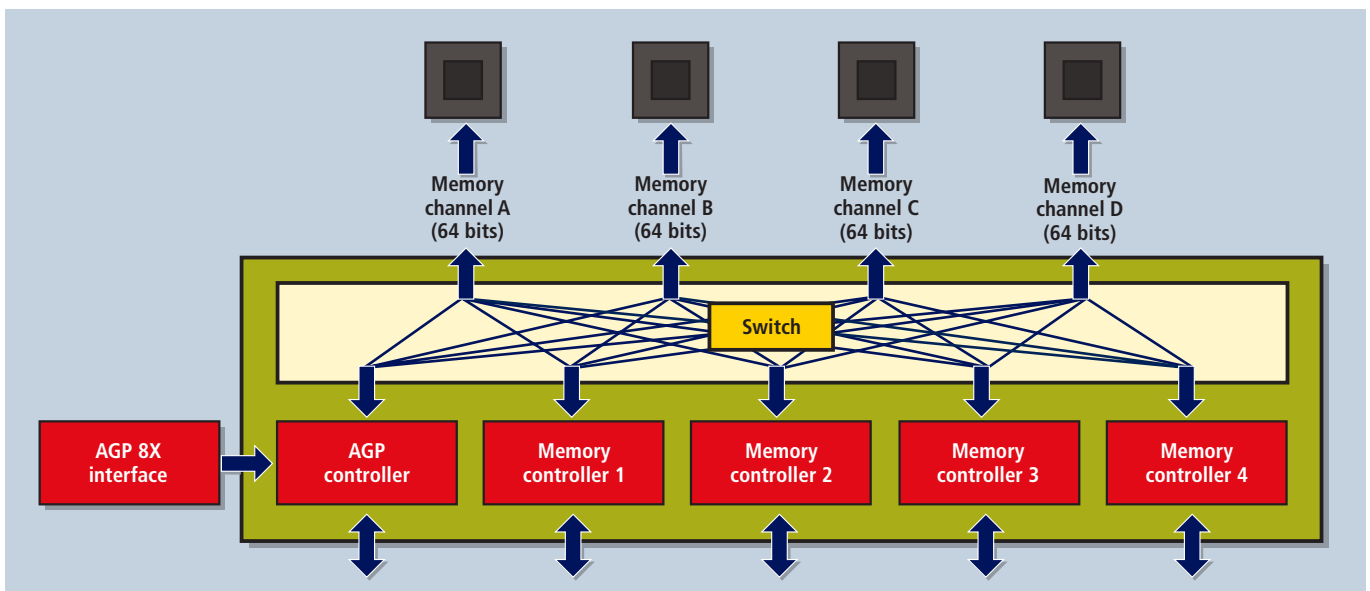
example, a simple 16-bit colour, 4-tap bilinear filtered texel calculation for eight pipelines requires 512 bits per cycle, which is within the capabilities of the 256-bit/DDR-SDRAM interface. Increase that to a 32-bit colour, 8-tap trilinear filter and the demand increases to 2,048 bits, while 16 texture units would double this to 4,096 bits per operation, which has the potential to create a significant performance hit.

Pixel and vertex shaders

Vertex shaders are programs that are used to modify the geometry of a 3D object, as well as lighting and shadows, while pixel shaders are used for colour control as well as the appearance of surfaces. DX9 puts a great deal of emphasis on programmable effects and includes version 2.0 of both the Pixel and Vertex Shader specification. As ATI designed this product to match the proposed requirements of DX9, it comes with four parallel vertex shader pipelines—twice that of the GeForce4 Ti 4600—and is capable of processing a single triangle and vertex operation per clock cycle.

With a triangle processing rate of 325Mega-triangle/s, the 9700 Pro should be well-equipped for DX9 Higher Order Surface techniques, such as Level Of Detail (LOD) tessellation and displacement map-

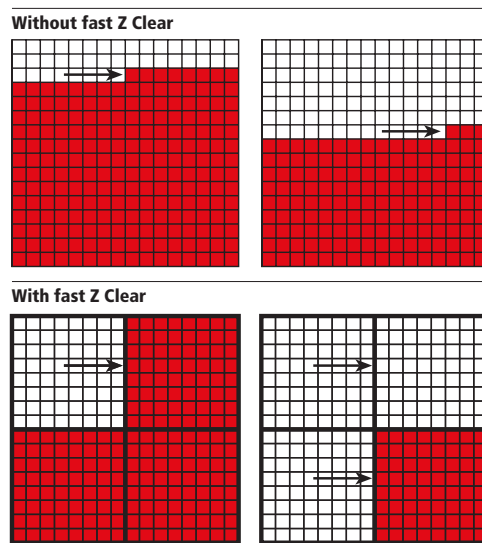
▼ Figure 1 A crossbar controller uses four independent 64-bit memory units to address up to 256MB of video RAM



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► **Figure 2** Instead of pushing data one memory address at a time, entire blocks of eight by eight memory are cleared by Z Clear



ping. Each vertex pipeline can also handle simultaneous vector and scalar operations, optimising instructions that combine the two data types.

Each of the pixel pipelines has its own hardware pixel shader—eight in total. As we've already mentioned, these are capable of 64- and 128-bit floating point colour precision and can increase image quality from calculated tones and shades. They can also manage up to three simultaneous instructions, one texture lookup, one colour operation and one texture address operation—and all to 96-bit floating point precision. A common-sense approach, given that typical pixel shader operations include a combination of each of these elements.

HyperZ III

Power is nothing without efficiency and ATI's HyperZ III engine brings three improvements to bandwidth-saving techniques: Hierarchical Z, Z Compression and Fast Z Clear.

Essentially the heart of 3D graphics, the Z buffer of a chip is used to manipulate and store the Z-axis value (or depth) of every point and object in the scene. It's a common bottleneck, particularly as the conventional 3D pipeline causes all objects in the scene to be rendered, whether they're visible or not.

Using a similar technique to VideoLogic's tiled-based rendering system, HyperZ III divides the pixel information in the Z buffer into blocks of 8 by 8 pixels. Analysis of each object in that block reveals whether or not it's obscured in the final render,

allowing the chipset to discard occluded objects—another term for this is occlusion culling—before sending the visible pixels to the pixel shader engines.

Z Compression simply compresses data before it's sent to the Z buffer, reducing the amount of bandwidth used and memory required. In the case of HyperZ III, compression of up to 4:1 can be achieved without data loss and up to 24:1 when 6X multi-sample anti-aliasing is being used.

Finally, Fast Z Clear reduces the amount of data required to clear the Z buffer before the next frame is drawn. Instead of flushing the data one memory address at a time, entire blocks of 8 by 8 memory cells are cleared (see Figure 2). This shrinks the load to 1/64th of its previous size. For example, a resolution of 1,600 by 1,200 pixels that would previously require 7.7MB of data to clear now takes just 124KB.

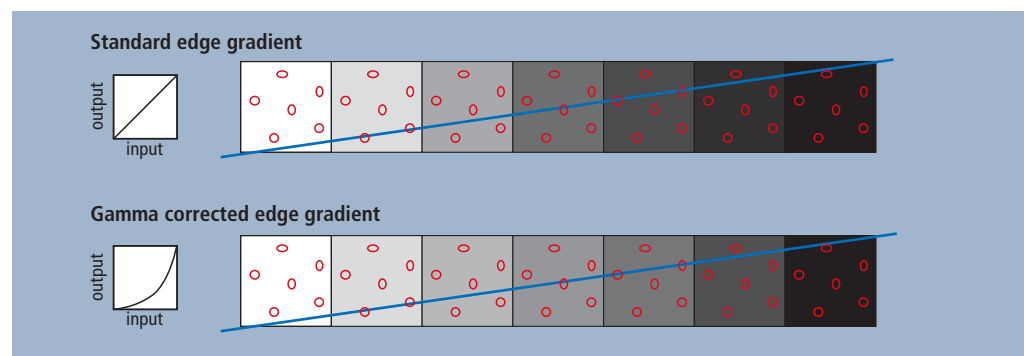
SmoothVision 2.0

Now a key feature for all 3D graphics cards, anti-aliasing (or edge-smoothing) has evolved from a simplistic, brute-force approach to an altogether more sophisticated technique. SmoothVision 2.0 has also matured, finally bringing multi-sample anti-aliasing to an ATI chipset.

It uses up to six sub-pixel samples of each pixel being drawn with a programmable 'jitter' pattern for improved sample efficiency. Plus, Z buffer lookups are used to compare 'overlapping' pixels, using the Z compression feature of the 9700 Pro to compress the sampled values to a ratio as high as 24:1. Alpha transparencies are also included in the calculations—an oversight with previous techniques—and a non-linear gamma correction is applied to bring anti-aliased pixels in line with the non-linear gamma curves of LCD and CRT displays and provide a smoother overall appearance (see Figure 3).

Another feature of the SmoothVision 2.0 engine is texture filtering. Standard texture filtering techniques, such as bi- or trilinear filtering, can cause blurring on textures that are viewed at a shallow angle, while anisotropic filtering typically takes 16 bi- or trilinear pixel samples from the texture map to create the final blend, rather than just the ones that are visible from the current viewpoint. However, this is a processor-intensive operation, so SmoothVision 2.0 has a scalable anisotropic filtering technique that changes the number of samples used, based on the slope of the underlying polygon. The more acute the viewing angle, the more samples are used, resulting in less texture blurring on angled surfaces.

► **Figure 3** SmoothVision 2.0 uses a non-linear gamma correction to bring anti-aliased pixels in line with non-linear gamma curves of LCD and CRT displays



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Where's nVidia's NV30?

With eight pixel pipelines, floating point operations and full DirectX 9.0 support, nVidia's latest GeForce chipset should soon overtake even the Radeon 9700 Pro. But why isn't it already on the shelves?

One of the reasons ATI is currently enjoying having the market to itself is that nVidia appears to have run in to some unforeseen difficulties with the manufacture of its next high-end chipset, previously called NV30 but recently announced as the GeForceFX.

Where ATI played it safe and chose to develop a slightly unwieldy 0.15-micron chipset, nVidia decided that it would have to push forward to a 0.13-micron die, which would make the GeForceFX smaller, cooler

and more efficient. However, the Taiwanese Semiconductor Manufacturing Company (TSMC) appears to be having some problems in building nVidia's chips and the only signs of nVidia's challenger have been limited to press releases and short 'our chip does that, too' feature announcements.

GeForceFX silicon has apparently been taped-out since August—which means that it should have been on the shelves a couple of months ago—and current silicon yields have been

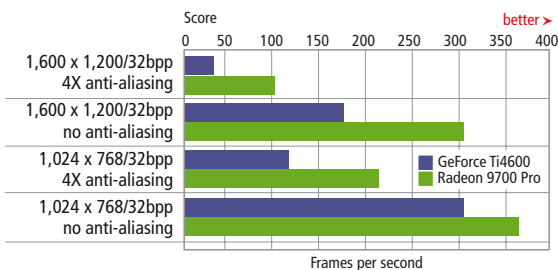
reported as being as low as 10 to 20 per cent. A 2002 launch was promised by nVidia, but it has admitted that boards are likely to be on the shelves around the end of January 2003. That's around four months behind schedule.

We do have some idea what to expect when it arrives. It, too, will have eight pixel pipelines and floating-point operations from start to finish, with a transistor count of 125 million. Full DirectX 9 support is promised, including Pixel Shader 2.0,

Vertex Shader 2.0 and higher order surface operations, such as vertex displacement and tessellation. Most importantly, the core speed of this 0.13-micron chip will be an incredible 500MHz, with DDR II SDRAM clocked at 1GHz, potentially putting it well ahead of the Radeon 9700 Pro. However, with the same 128-bit memory interface as the GeForce4 Ti series, it's possible that the GeForceFX will have an Achilles heel. Only a review sample will tell. **LAURENCE GRAYSON**

VNU Labs report

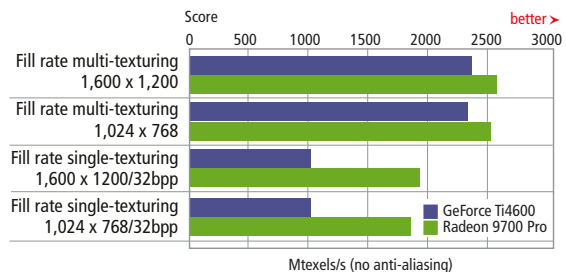
Overall score—3D WinMark 2000



The Radeon 9700 Pro dominates virtually all of the tests and the chip's higher fill rate and memory bandwidth really starts to show its class when you start pushing resolutions up to 1,600 by 1,200 and adding anti-aliasing to the mix.

However, 3DMark 2001's multi-texturing tests reveal a performance blind spot on this card. While single-texturing is way ahead of the GeForce4 Ti 4600, the Radeon 9700 Pro's multi-texturing results are less advanced. As multi-texturing is

MadOnion 3DMark 2001—Single and multi-texturing tests



one of the key techniques for increasing scene realism in modern software, this could well be a serious shortfall on the ATI chip's part and we can't help but be a little concerned about the effect this may have on future software.

While the GeForce4 Ti4600 has a weakness when it comes to anti-aliasing, the HyperZ III engine of the 9700 Pro makes 4X anti-aliasing at 1,600 by 1,200 pixels a real possibility, and with almost no performance hit at lower resolutions.

Conclusion

The figures here speak for themselves and make it perfectly clear that there's nothing on the market at present that even comes close to challenging the Radeon 9700 Pro for performance. Even though software that makes the most of this product's advanced features isn't likely to become commonplace until DirectX 9 has had a chance to stretch its legs, the speed increase you get on current DirectX 8 software is more than enough to justify buying it.

It's true that the Radeon 9700 Pro won't have the market to itself forever and the next chip from arch rivals nVidia is likely to change the state of the leaderboard once again, but this has always been the case with 3D graphics. The more cautious purchaser may want to wait and see what the next couple of months hold—or even wait for the 0.13-micron chip that ATI is probably developing. Early adopters, however, should be placing their order for a Radeon 9700 Pro right now. ■



WEB TUTOR
ALEX CRUICKSHANK

Using ASP to create Web pages

Perl is an extremely useful programming tool, but it does have its limitations, especially when it comes to Windows servers, so here we're going to take a look at Active Server Pages (ASP)

KEYPOINTS

- Browser detection
- Example code
- Why ASP?
- Using databases
- Database connectivity

Much of the Web-oriented code we've shown you in *PC Magazine* over the past year or so has been written in Perl, for use with Common Gateway Interface (CGI) Web connections. Perl is ideal if you're running a Unix server with good memory management, since you get everything free when you install Apache or Zeus, or pretty much any other Web server. And if you know the ins and outs of Perl, it's exceptionally powerful, particularly at pattern matching, binary and text file manipulation, and tight server integration.

However, it also has disadvantages, particularly if you're using a Windows-based server, for which you'll have to use a third-party Perl interpreter. Perl launches a separate instance of the interpreter whenever a script is run, which means that simultaneous accesses will eat—and possibly leak—memory. Also, database integration—at least with commercial databases—isn't easy for the beginner. In fact, not much to do with Perl is easy for the beginner, although the reasons for the complexity become clear once you get to grips with the fundamentals of the language.

None of these disadvantages are necessarily terminal, but taken together they make the case for using an alternative to Perl when running Windows servers. One of the most popular options is Active Server Pages (ASP).

Active Server Pages are almost exclusively found on Windows NT and Windows 2000 servers. ASP code is incorporated into HTML pages and then interpreted by the server software before a page is served. In this way, the main features of an HTML page can remain the same, with just a few components—stock market prices, for example—being updated each time the page is called via HTTP. In this respect it's very similar to PHP.

ASP pages on the Web will usually end in '.ASP'. VBScript is often used to develop ASP

1 Testing that ASP works properly

```
<%@ Language=VBScript %>
<HTML>
<BODY>

<% Response.Write("This is ASP") %>

</BODY>
</HTML>
```

2 Browser detection using ASP

```
<%@ Language=VBScript %>
<HTML>
<BODY>

<% dim BrowserType

set bt = Server.CreateObject("MSWC.BrowserType")

if bt.browser="IE" then BrowserType = "MSIE"
elseif bt.browser="Netscape" then BrowserType = "Netscape"
end if %>

<% select case BrowserType

case "MSIE"
Response.Write("Internet Explorer detected")

case "Netscape"
Response.Write("Netscape Navigator/Communicator detected")

case else
Response.Write("Unknown browser (Opera? Lynx?) detected.")

end select %>

</BODY>
</HTML>
```

pages, but it's also possible to use Jscript (Microsoft's variant of JavaScript), Java and, confusingly, even Perl for the relevant code.

Example ASP code

If you decide to use ASP on your site, the first thing to do is familiarise yourself with the implementation of the code. Listing 1 shows a very simple example of what ASP can do.

The first line (<%@ Language=VBScript %>) is optional. But, if it isn't included, the server will assume you're using VBScript anyway, so it only really needs to be defined when other languages are being used instead.

When the script is loaded on a Web server as an ASP file and called via HTTP, the server will read the page, insert the appropriate data wherever it finds code in a <% %> tag, and send the resulting HTML to the browser.

If you're familiar with JavaScript, you'll notice that the 'Response.Write' command is similar to JavaScript's 'Document.Write'. There are other similarities too, but where ASP differs from client-side scripting languages is in the sheer breadth of tools and properties available. The 'Response' object used above is one of several objects included with ASP by default, but there are literally hundreds of plug-ins available and you can even write your own as a COM object if it's absolutely necessary.

The code example in Listing 1 is very simplistic, but ASP can take the place of the majority of dynamic elements in any Web site. Let's say, for example, that you currently use client-side JavaScript for browser detection, sending different pages to different browsers to ensure compatibility. While client-side checking takes some of the load off your Web server, it won't work if users have JavaScript disabled for some reason.

An alternative is to create an ASP page that will detect what type of browser is being used by the client and supply data accordingly. The detection routine is actually quite simple, as shown in Listing 2.

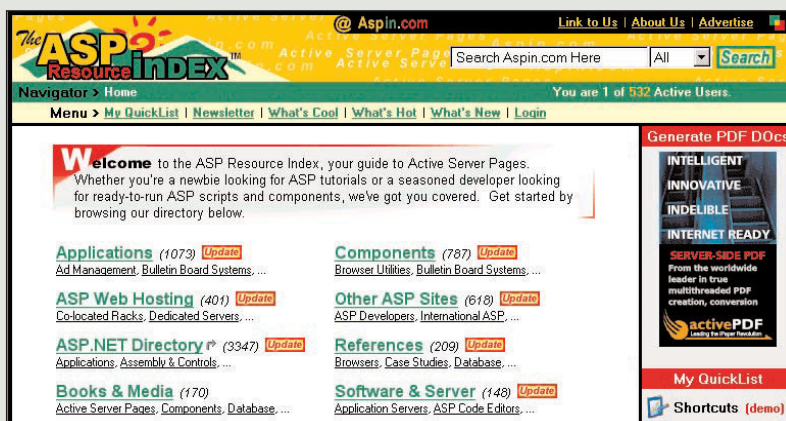
Once again we've declared the type of language being used (VBScript), then encapsulated the dynamic code within <% %> tags. This document uses a standard ASP object (MSWC.BrowserType) to return the value we're after. Our example above isn't as specific as some JavaScript browser detection methods, since it doesn't return minor version numbers, but you can extract those from the MSWC.BrowserType object too if necessary.

The code we've used here tells the client which browser they're using, but you can place anything you like in the relevant 'case' sections; perhaps a redirect to a browser-specific page, for example, or a cookie-generation routine so that you don't have to run the browser detection test on each page served to that particular user.

Why choose ASP?

The following are the main benefits of ASP compared to Perl/CGI when you're running a Windows server

- The scripting language that's **most commonly used** to create ASP pages, VBScript, is based on Microsoft's popular VisualBasic development language. This means that there's already a large installed base of developers who understand the language.
- ASP development is relatively easy. CGI/Perl scripts are usually developed in a text editor and then laboriously interpreted to trap error messages and fix buggy code. ASPs, on the other hand, can be developed in a **visual environment** with error trapping and full online help, using products like Visual Studio.
- The development and installation environment for ASP will be **familiar to many users**. Windows applications and server tools are quite often more user-friendly than their Unix counterparts, so developers won't have to spend time learning a completely
- new operating system just to develop interactive Web pages.
- Database connectivity is **powerful and easy** to execute. Connectivity via ODBC with Access and SQL means that the time spent making database connections can be kept to a minimum.
- For uncompiled CGI scripts, you need to launch a separate process for each new user. However, ASP code loads the **relevant module** into memory just once, which means that ASP is better at handling multi-threaded, concurrent requests than CGI.
- ASP keeps much of the dirty work **out of the developer's way**. You don't have to remember the correct syntax for file manipulation, for example, since low-level operations are handled for you. This is the opposite of Perl/CGI, where you're expected to handle file operations yourself.



▲ Sites such as this wouldn't be viable without a database back-end

Using databases with ASP

So far we've shown rather basic examples of what ASP can do, with very little dynamic content involved. But there are many large sites on the Web whose pages are served entirely using ASP. Obviously, they make use of rather more complex code.

For sites like this, the real strength of ASP is its ability to act as a front-end to a database. After all, that's what the majority of Web sites are—databases. Information is returned to the user based on the user's action, whether

that's typing words into a search box, requesting the latest news story, subscribing to a newsletter, or checking the latest stock prices. So it makes sense to store all the content of your Web site in a database, retrieving it as and when necessary and then formatting it according to the requirements of your site.

The most common database tools for ASP pages are Microsoft Access and SQL. For smaller sites, Access will suffice. Importing your source data into a database is a major topic in itself, but if you know the basics the

only additional data you'll need is how to connect your database program to the Web server (see Database connectivity sidebar).

Once your ODBC connection has been configured, you'll need to know the ASP code for retrieving data from it. In the example in **Listing 3**, we've included the core of this code, leaving out some of the initialisation parameters, which would pre-define ('dimension') the variables that we were about to use. Any line beginning with a single quote is a comment and is ignored by the ASP parser.

Connecting to the database itself isn't too difficult, requiring just half a dozen lines of code. Once the connection has been made, it's even easier to retrieve a piece of data and place it into a variable, which can then be manipulated on the HTML page.

Rather than laboriously duplicating this database connection code in each ASP page on your site, it's easier to do it once and store this as an include file. You can then retrieve database values in your pages quickly using just one line of code. This is done using a statement at the top of the ASP page, such as `<!--#include file="common.inc" -->`.

Here we've demonstrated a sample of what ASP can do. It has several advantages over CGI, arguably the most compelling of which is the simplicity and scalability of its database functions. If your site is growing fast and CGI scripts are placing an ever-increasing load on your server, you should seriously investigate ASP as an alternative. For more information and some free example ASP code, search the Web for 'ASP code'. ■

3 Connecting to a database and retrieving data

```
<%
'...variables would be dimensioned above this point

'Create database connection
'Initialise the strAccessDB variable with the name of the Access
database
strAccessDB = "example.mdb"

'Create a connection object
Set adoCon = Server.CreateObject("ADODB.Connection")

'Database connection info and driver
strCon = "DRIVER={Microsoft Access Driver (*.mdb)}; DBQ=" & Server.
MapPath(strAccessDB)

'Set an active connection to the Connection object
adoCon.Open strCon

'Initialise the SQL variable with an SQL statement
strSQL = "SELECT tblConfiguration.* From tblConfiguration;"

'Query the database
rsConfiguration.Open strSQL, strCon

'read in an example entry from the record set
strWebsiteName = rsConfiguration("website_name")

'print the result on the page
Response.Write strWebsiteName

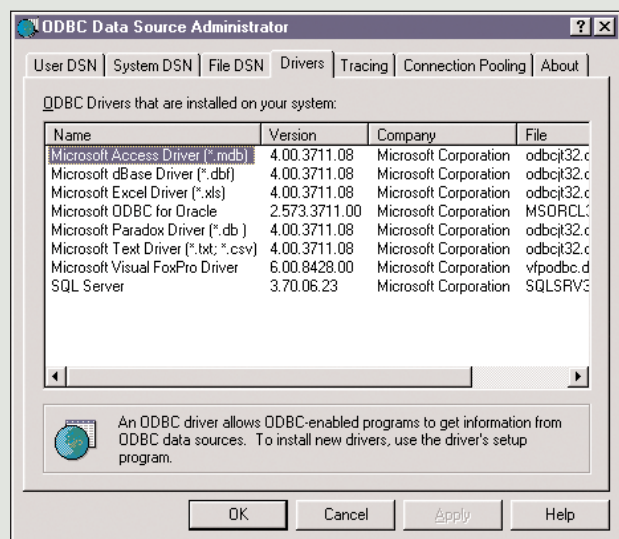
'... and so on.
%>
```

Database connectivity

CONNECTING A DATABASE program to your Web-serving software is essential if you want to perform live queries via HTTP, returning the results in your ASP pages. In order for this to work correctly, you'll need an ODBC-compliant database program (which the vast majority are) and the appropriate ODBC driver. If you're using Microsoft Access, the relevant ODBC driver is supplied on the installation CD-ROM. For other databases, you may need to download a driver from the appropriate Web site.

Once you have the relevant driver, open the Control Panel and launch the ODBC application. From here you'll be able to add and remove ODBC data sources. If your database program isn't already listed, click on the 'Add' button and follow the prompts, navigating to your new ODBC driver if necessary.

After the new ODBC driver has been installed, you'll be able to enter a specific database to use as a data source. It's from this that your ASP/HTTP requests will be fulfilled.



▲ Ensure that the appropriate ODBC drivers are installed



OFFICE TUTOR

GEOFF EIMON

Managing your data

Excel has traditionally proved invaluable as a simple database manager. It's also great for maintaining inventories or address lists. But did you know that Excel also has some very useful tools to help manage these simple databases?

KEYPOINTS

- Resetting selection data
- Excel's Data form
- Changing records
- Creating a mailing list

In this article, we're going to provide you with a hands-on exploration of Excel's Data form (Figure 1). On the *PC Magazine* Web site (www.pcmag.co.uk/PCM/solutions.jsp) you'll find the *SampleCustomers.xls* file on which we'll carry out our hands-on examination of the Excel Data form. To experiment with its data management features you'll need to have Excel 97, 2000 or 2002 installed.

The *Customers* worksheet in the *SampleCustomers.xls* workbook is a basic name and address list that contains data records on 91 fictitious individuals. Open this worksheet and take a look at the data. The row of labels in the first row gives a good indication of their column contents. One of the things that we might want to do with this type of data is select individual records, for example, to set up a mail merge. The *Select* column is designed to help us achieve this. In *SampleCustomers* the contents of the *Select* column are either *N(o)* or *Y(es)*. To identify a row (record) for selection the 'N' entry is changed manually to 'Y'. Before we start our exploration of the way that Excel's Data form helps us manage the *SampleCustomers* data, let's reset its *Selection* column so that every cell contains 'N'.

Resetting the selection data

The simple way to do this is to select cells D2 to D91, delete the selection using the *Delete* key, type 'N' in cell D2 and then copy cell D2 down to D92. Another way to do this is to make sure that D2 contains 'N'; click in D2 to select it; then move (not drag) the cursor to the bottom left hand corner of the cell until the cursor changes to a cross-hair shape. Click and hold the right mouse button and then drag the cross-hair down to D92.

Try this once or twice so that you're happy with the process. Now, to make life more

interesting, let's record a macro that does this. This will be useful later since we'll need to reset this column frequently.

Creating the *ResetIt* macro

Select the *Macro* item from the *Tools* menu, followed by *Record New macro*. If you haven't recorded a macro before, don't worry—if you make an error you can always start again.

In the *Record Macro* dialog box (Figure 3), call the new macro: '*ResetIt*'. When you click *OK*, the *Record Macro* dialog box is closed and the *Stop Recording* dialog box is displayed on the worksheet. This provides the *Stop Recording* button (a black square), which you'll use when you want to stop the recording. The presence of the *Stop Recording* dialog box also indicates that any keyboard or mouse actions you make will be recorded.

With the *Stop Recording* dialog box visible on your desktop, carry out one of the operations described above to display the 'N' character in cells D2 to D92 and then click on the *Stop Recording* button.

Test the macro by first changing some of the 'N's back to 'Y's. From the *Tools* menu select *Macro* and then *Macros*. In the *Macro* dialog box, select the *ResetSelect* item and then click the *Run* button.

If you haven't used Office's macro facility before, Excel simply uses a macro to translate your actions into VBA code, which you can then run by selecting it from the *Macro* dialog box. To see the code that you created, select the *ResetSelect* item in the *Macro* dialog box (*Tools* | *Macro*) and then click the *Edit* button to display the code.

Excel's Data form

Open the Data form (Figure 1) by selecting the *Form* item from Excel's *Data* pull-down menu. When it opens, the contents of the first

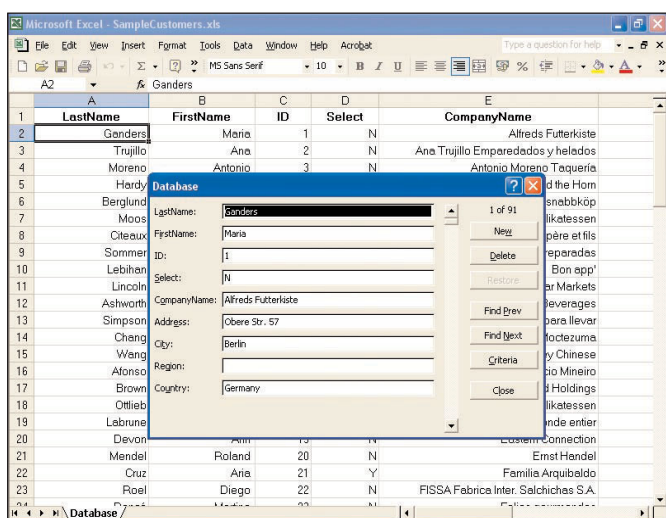
(top-most) item in the *Database* worksheet are automatically displayed (see Figure 1). Notice that the Data form displays the fields from this record in the order in which they occur in the record's column structure and that the form takes its name (displayed in its top frame) from the host worksheet.

Click the Data form's *Find Next* button several times. You'll see that on each click it displays the next (immediately lower) record. Notice that the record counter (located in the top right of the Data dialog box) increments with every click and also displays the total number of records in the table. If you haven't sorted the *SampleCustomers* records they'll be in numerical order (1 to 91). In the unsorted database the record number displayed by the Data form's record counter will correspond with the value in the *Database*'s *ID* field. However, the form's record counter isn't 'reading' this *ID* field. The record number is generated from the current records position from the top of the table so that if you resorted the records by the *LastName* or *City* columns you would see that the numbers displayed in the *ID* field and the form's record counter are 'out of sync'.

Clicking the *Find Previous* button steps back through the records and also decrements the record counter. When you reach the top-most record, further clicks on the *Find Previous* button generate warning 'beeps' indicating that there are no more records to be displayed.

Finding records

Click the Data form's *Criteria* button. This clears the fields to allow you to enter criteria to locate an individual record or a set of records. The characters you enter into any field act as a case insensitive 'stem' for a search word. For example, type in 'peter' to the Data form's *LastName* and click the *Find Next* button sev-



1 Excel's Data form displays each field in the current worksheet row

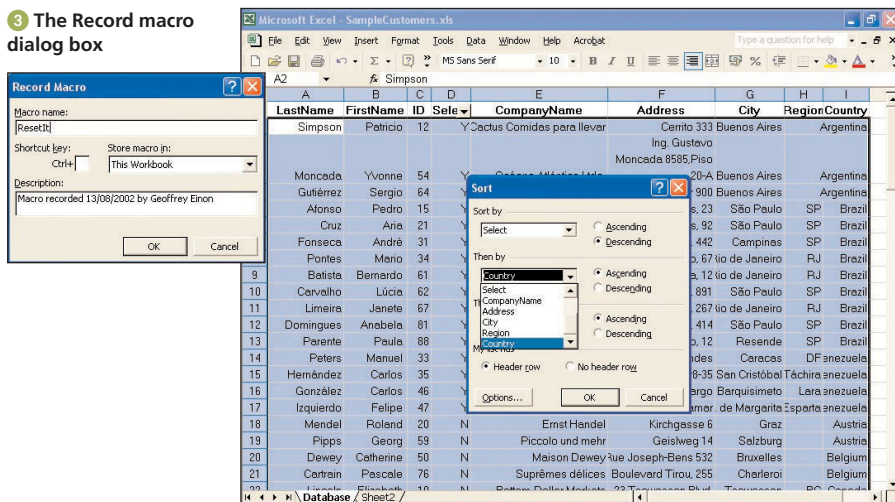
replaced by the New Record label to prompt the current function of the form. Before adding a new record to the SampleCustomers database, it is advisable to make a note of the number of records in the database so that you can calculate the value to be entered in the ID field to identify the new record.

Creating a mailing list

Let's say we want to create a mailing list for all customers in South America to use as the basis of a mail merge. To do this, we will first have to manually identify each record with Argentina, Brazil or Venezuela in its Country field by entering a 'Y' into its Select field. In this way we will manually create a search using 'Argentina OR Brazil OR Venezuela' as the search criterion. The second stage is to sort the records on the Select column to group the South American contacts into one contiguous region in the worksheet. The last stage in this process is to copy these contiguous records into an empty worksheet.

2 Excel's Data Sort dialog box is used to sort the SampleCustomers worksheet by its Select field

3 The Record macro dialog box



eral times. If the SampleCustomers data hasn't been changed, the 'peter' search will reveal two Peters and two Petersens.

Any combination of fields can be used as search criteria—these are then ANDed by the form to create a more restrictive search criterion. For instance, repeat the 'peter' search but, this time, also type 'den' into the Country field. This time only one record is returned.

Deleting records

Pressing the Data form's Delete button removes the currently displayed record from the database. The Delete button simply removes the row containing the record currently displayed from the worksheet. This deletion becomes permanent when the worksheet is next saved. Note also that the Restore button does not restore deletions.

Changing records

Because of its convenient display of the complete contents of a row in a worksheet, Excel's Data form makes changing information very easy. With a record displayed in the Data form, changes can be made by simply editing the appropriate field. For example, in the

Ganders record (ID 1) in the City field, change Berlin to Hamburg. Now, when the form is closed this change is written to the worksheet and the change made permanent the next time you save the workbook.

Adding records

The biggest strength of Excel's Data Form is that it lets you add records very easily. The Data form's new button clears all its fields ready to accept new information. When the form is closed, the new record is added as the last item in the worksheet database. This is a very convenient and straightforward way of adding data but you have to be very careful—the data form doesn't support any entry checking. For instance, you can't specify that important fields, such as LastName, Select or ID, have to contain entries.

Neither does the Data form support automatic numbering of records. In the sample database, the ID field is used to indicate the order in which records were entered. This information has to be manually entered. Note that during the entry of a new record, the record counter display, which displays the total number of records in the database, is

To start, run the SelectIt macro to remove any 'Y's from the Select column. Next, open the Data form and click the Data form's Criteria button to clear the form. In the Country field type 'Argentina'. Make sure that all the other text boxes on the Data form are empty. Click the Find Next button to display the first 'Argentina' record. In the Select field replace the 'N' with 'Y'. Repeat this operation until you have stepped down through all the 'Argentina' records and have replaced all the 'N's with 'Y's. Repeat this procedure to identify the 'Brazil' and 'Venezuela' records. Close the Data form and save the worksheet.

We now want to group all the South American records together by sorting the worksheet. To do this, select the entire set of records—but take care to exclude the first row containing the column headings. Then select the Sort item from Excel's Data menu. In the Sort dialog box, use the drop-down control in the Sort by section to choose the Select field and then select its Descending Radio button. Click the OK button to start the Sort operation to display the South American records in the top rows of the database. Select these records—including the column headings—and copy and paste them into the Sheet2 worksheet. Rename Sheet2 as South America to identify this new data set.

All the operations described above—finding, editing, deleting and adding records and creating mailing lists—can be done directly on to the worksheet without the help of Excel's Data form. But, our hands-on exercises should now have convinced you that through its 'up-front' display of individual records and the actions that it automates through its collection of buttons, Excel's Data form is a useful and productive tool to have in your personal database management toolkit. ■



MASTERCLASS

ALEX CRUICKSHANK

Going live with CMS

A content management system is the backbone of your Web site. In the sixth instalment of our series we continue with our CMS development and show you how to go live without drama

KEYPOINTS

- Editor.cgi and upload.pl scripts
- Rewrites and redirects an .htaccess file
- File directory tree
- What you'll need

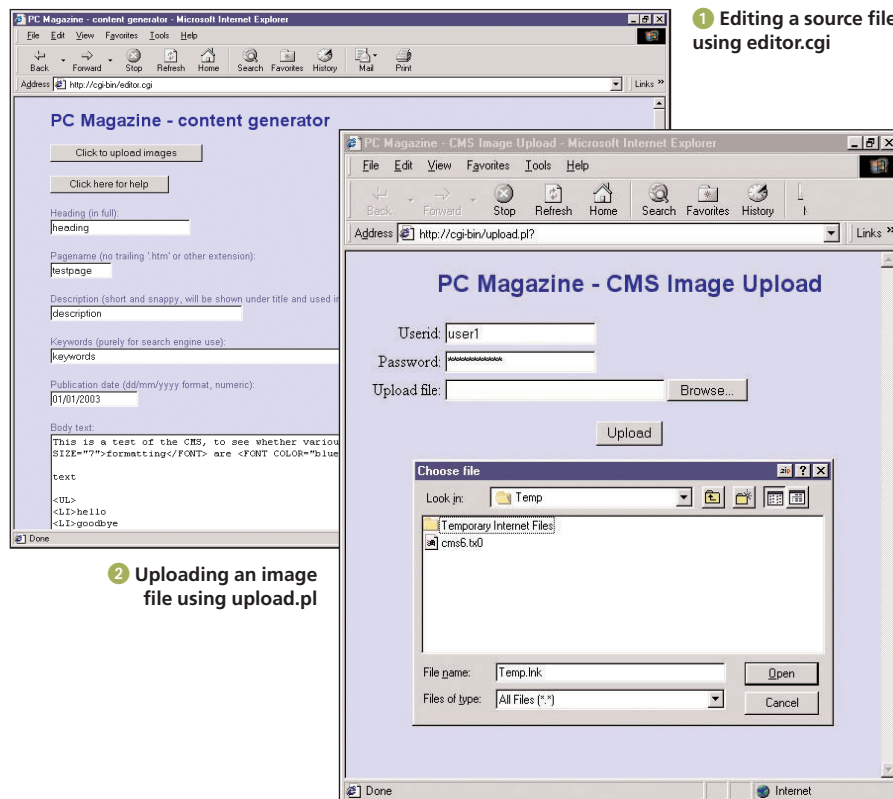
In the last e-book (November), we published part five of the CGI content-management system (CMS) feature that started life in the print version of *PC Magazine*. Here we look at ways in which the system can go live with the minimum amount of fuss on the part of the Webmaster or the visitors to the new site.

However, we'll run over the basics of the CMS again, explaining what it was designed to do and how each component works.

Few people know how successful their Web site is going to be before it actually goes live. Companies like Intel and Microsoft can obviously predict that the traffic to their sites will be considerable and therefore budget for powerful back-end systems to maintain, edit and serve all their content. But for the majority of organisations it's rarely that simple.

Many boards of directors will err on the side of caution, offering only a limited budget for the development of a company Web site until it's proved its worth to the company. It's not unusual for medium-sized companies to have a single Webmaster with very little in the way of additional design and development resources, while in smaller companies the maintenance of the site is often carried out by an enthusiast in their spare time.

The problem with this approach is one of management. It's fair enough to start with a few simple HTML pages and keep adding to them as the site gets larger, but after a while it will become unwieldy. Any attempt to change the design of the pages will require careful search-and-replace operations across all the HTML files in the site. That's easy enough for minor changes, but once you decide to change the layout, add extra navigation bars, rearrange the body text and incorporate banner advertisements or other dynamic content, this becomes near to impossible. The developer is faced with the onerous task of either



1 Editing a source file using editor.cgi

2 Uploading an image file using upload.pl

going through each page and making changes by hand or upgrading the entire site to run via a content management system.

It's the latter approach that we've been working on over the last six issues. Content management systems form the backbone of all the major sites on the Web. The point is to separate content from design, so that anyone—even those with limited or non-existent knowledge of HTML—can update the content of the site and add new pages. The front-end of a CMS gives a user-friendly screen where users can create and edit page

text, add links to other pages, define the publication date and page category and so on. The CMS then takes this information, adds HTML formatting, embeds the result in an HTML template and serves it on the site.

It's possible to build a CMS in Access, ASP, PHP, C++, Java and just about any other programming language or Web-enabled database system. All have their advantages and disadvantages. The CMS we've been building uses CGI and is written in Perl, which has several advantages for our particular requirements. It's free, so the implementation of the entire

CMS won't take a penny from your Web site development budget. It's also flexible, in that particular conditions can be set up so that, for example, 'special offer' pages can be dynamically flagged to use a different HTML template to the rest of the site. Most important of all, though, Perl's text manipulation engine is one of the most powerful available. Its ability to search and replace, pattern search and extract text from strings will enable you to convert existing sites to CMS delivery without too much editing by hand.

The first few instalments of the development process concentrated on one particular Perl script called `editor.cgi` (see Figure 1). This is the back-end component of the CMS. It allows the user to create new pages or edit existing ones, enter page data to the appropriate fields and check that the output looks correct. It's all achieved through HTML forms, the contents of which are checked to ensure that the user has completed them correctly. Some HTML knowledge will be required by the user, but only minor formatting tags, such as those for bold and italic. A pop-up Help box has also been included to explain how to link to other pages and embed images in the page. This can be edited by the administrator, who can also include more input fields.

Linked to the `editor.cgi` script, is a script called `upload.pl` (see Figure 2). This is a free-ware package sourced from the Web (see the contents of the file itself for the programmer's details), which allows the CMS user to upload images directly from within a browser, without having to use an FTP package. This is excellent from a security point of view (letting users play around with FTP is a recipe for disaster) and it makes the CMS easier to use.

In order to use the file upload script, you'll have to prepare a user file. This is called `users.db` and it contains the username, password and upload file directory of each authorised user. This means that you can restrict the image upload process to specific users. Since we'll be setting up a separate authorisation process for the main part of the CMS, this also means that you can allow image access to your designer while restricting access to the main CMS to your content editors.

The contents of the `users.db` file, which you can open in a text editor, will look something like that shown in **Listing 1**.

There are three values on each line, separated by the pipe character ('|'). The first value is the User ID, the second an encrypted password and the third the path to the upload directory. In the above example, User1 has access to the 'products' image directory and User2 has access to the 'news' directory, both of which are under the 'images' directory.

To generate encrypted passwords for this file, either use the Unix 'crypt' command or use the simple Perl script, called `password.pl`,

1 Example contents of the `users.db` file

```
User1|jG/cm6kE/UCzc|../images/products
User2|fhauhjKHAJKD3|../images/news
```

2 Redirects within an `.htaccess` file

```
RedirectPermanent /index.htm http://www.yoursite.co.uk/cgi-bin/content.cgi?page=/index
RedirectPermanent /contacts.htm http://www.yoursite.co.uk/cgi-bin/content.cgi?page=/contacts
RedirectPermanent /facts.htm http://www.yoursite.co.uk/cgi-bin/content.cgi?page=/facts
RedirectPermanent /news.htm http://www.yoursite.co.uk/cgi-bin/content.cgi?page=/news
```

3 Rewrite rules within an `.htaccess` file

```
# Rewrite rules require this bit
RewriteEngine on
RewriteBase /

# Read about regular expressions (regexps) to find out more about
rewrite rules, which are very powerful. But avoid circular references.
RewriteRule ^products/h([0-9]+)([A-Za-z]?)([0-9]?)\.htm /cgi-bin/products.cgi?page=/h$1$2$3
```

that you can download from our Web site at www.pcmag.co.uk/PCM/solutions.jsp (note that this program shouldn't go live on your site—it's only included here for the purpose of generating passwords for `upload.pl`). Edit this file in a text editor to change the `$password_to_crypt` variable to your chosen password, upload the file to your server, access it in a browser and an encrypted version of the password will be generated. Then cut and paste this into the `users.db` file.

The part of the CMS that serves the HTML pages is called `content.cgi`. This is called via an HTTP command, such as "`www.yoursite.co.uk/cgi-bin/content.cgi?page=/pagename`". It then opens the appropriate source file, extracts its contents, wraps them in a template and sends them to the browser (see Figure 3). Error-trapping routines have been built in to handle illegal calls to the script.

You'll find all these scripts, which have been described in detail in previous instalments of this series, on the *PC Magazine* Web site (www.pcmag.co.uk/PCM/solutions.jsp), along with the necessary support files. There's also one more Perl script called `convert.pl`, which we'll be investigating in a future issue. The Perl scripts can be opened and edited in any text editor, although a programmer's text editor is best because you'll then have colour-coded statements, variables and so on, which makes the whole thing easier to read and edit.

Installation on your server should use the directory structure in **Figure 4**, although you can alter this as long as you change the relevant variables in the main scripts.

At this point, we're ready to start using the CMS properly. It's a good idea to put it on a

development server first and check that everything works properly before you commit to using it. You may want to change some features to better suit your site. But assuming you've thoroughly tested the CMS and decided that it's right for you, a significant problem will quickly make itself apparent. If you already have a successful Web site, using the CMS instead of your static HTML pages is going to change all your URLs.

There are various inelegant ways around this: you could keep static copies of your pages for a while until traffic to the older pages dies down; or put 'You will be automatically redirected' pointer pages in their place. There's a better approach, though; one that will seamlessly direct the user to the appropriate page without them even being aware that the old page has moved. In fact, there are actually two methods of doing this, which we'll look at.

These solutions require your server to support '.htaccess' files, which most do. An '.htaccess' file is a text file that sits between the HTTP server and the browser, in effect, and can translate some incoming commands and outgoing data into a different format. This is particularly useful when remapping URLs and redirecting users to different pages.

Here we'll cover the basics of URL remapping. To start with, create an empty file called '.htaccess' using a text editor. You'll find this can be difficult with some editors, which either don't like files beginning with '.' or want to put '.txt' at the end. And some versions of Windows don't like renaming files to '.htaccess'. If you have problems, use a more intelligent editor, such as UltraEdit-32. Most freeware and shareware text editors will let

you save a file with the correct name. Otherwise, you could always rename the file once it's been uploaded to the server.

One of the easiest ways to remap a URL with .htaccess is to use redirects. Some examples are shown in **Listing 2**. Note that there are three parts to each entry: the 'RedirectPermanent' part, which tells browsers and search engine robots that the page has moved permanently; the *relative* URL of the old page; and then an absolute HTTP address for the new page. Any other format won't work, so be sure to check this carefully.

Note that the first entry is for the home page, which people often forget. Any request for www.yoursite.co.uk is actually a request for www.yoursite.co.uk/index.html (or www.yoursite.co.uk/default.htm or www.yoursite.index.htm and so on depending on the server). To ensure that people can find your new home page, include a redirect entry like the one shown in the listing.

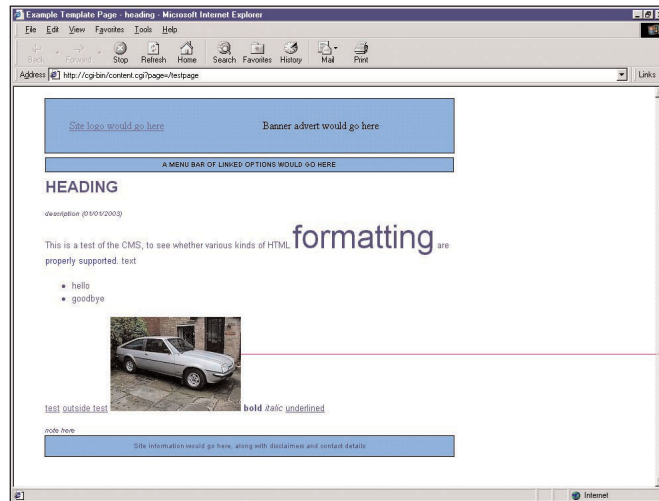
At this point you can upload the .htaccess file to your server. Use an FTP client (unless you have local access) to place the .htaccess file

WWW Root

```

├── /cgi-bin/
│   ├── editor.cgi
│   ├── content.cgi
│   ├── upload.pl
│   └── password.pl (temporary, just to create passwords)
├── /data/
│   ├── users.db
│   ├── HTML template file
│   └── [text files generated by the CMS will also go here]
└── /images/
    └── [uploaded images will go here]
  
```

4 File/directory tree



3 Displaying an HTML test page using content.cgi

in the root of the directory to which you want it to apply. You can have different files in different directories if you want—just be careful that the rules set up by one aren't contradicted by the rules set up by another in a higher directory. If they are, the server will loop round and round in circles, wasting precious processor cycles.

One potential annoyance with redirects is that if you have a lot of pages on your existing site, the .htaccess file will quickly become rather large. Also, any URL shown in the user's browser will change to the new one, because the server is literally redirecting the browser to a different page. But the second method of URL remapping gets around both these problems. Using rewrite rules, again in the .htaccess file, you can intercept the URL request for a whole range of pages and remap them. A little bit more knowledge is required here, notably of Unix regular expressions (regexps), which are used as wildcards to match different types of URL. You should also

bear in mind that this will add a small server overhead whenever a page is requested.

First, you need a line in the .htaccess file to switch on rewrite rules and another to define the root path from which they'll be processed, as shown in **Figure 4**. The other line remaps generic URLs such as www.mysite.co.uk/products/h340a.htm to www.mysite.co.uk/cgi-bin/products.cgi?page=/h340a. There are three parts to each line, but this time the third is a straight replacement for the second.

The sections in brackets are pattern matching terms and the '\$1' and similar are variables that match these terms. For a detailed explanation of how this works, search the Web for 'regexp rules' or 'regular expressions'. These rules are complicated but powerful, so always test them carefully. And, as before, avoid circular references.

Next time we'll look at some methods of restricting access to the editor section of the site, to ensure that only authorised users can make changes to the site's content. ■

Here's what you'll need

THE MOST IMPORTANT REQUIREMENT of the content management system is a Perl interpreter. If your server's running on a Unix box (including Linux) then you'll find it's almost impossible to install Apache or Zeus without also installing Perl. The same isn't true of Windows servers running IIS, but a free port of Perl for 32-bit Windows machines is available from www.activestate.com. This comes with all documentation and is simple to install. The only caveat to this is that file paths may be slightly different compared with a Unix box. If in doubt, use absolute rather than relative

paths (for example, /site/www/data rather than ../data).

Perl scripts need to be set to 'executable' to run. Using your FTP client, you should be able to right-click on a script once you've uploaded it to your server and select 'File properties' or 'File attributes' or 'chmod'. Then you'll be asked to define the file's attributes. A shortcut is to type '755' into the 'chmod/manual' box if your FTP client allows it. If not, set the permissions as follows:

- owner: read, write and execute
- group: read and execute
- public: read and execute

Generally this is only necessary with Unix servers. With Windows servers you probably won't need to change any permissions. But you may have to tweak IIS to ensure that .pl and .cgi files in the cgi-bin or cgi-local folder are executable.

The scripts also use some additional Perl modules that may not be included as part of your standard configuration. The two main ones are "Time::Local" and "Image::Size". If these aren't already installed on your server, you can download them from www.cpan.org. See your Perl documentation for notes on installing new modules.